

Università Ca' Foscari Venezia

# Climate Change in Fiction

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## Introduction

It has been said that throughout history, fiction has always responded to wars, crises and calamities (Ghosh 16). This is only natural bearing in mind that narratives have been said to help deal with threats by making them understandable and therefore bearable (Bruner 16), and even being an essential part of healing, not just metaphorically but physically as well (Charon 3). Naturally, this highlights the importance of fiction as the field that invents, reflects upon, and changes narratives that influence our daily lives. It also explains why we expect fiction to respond to the most urgent and pressing issues of our times, of which today climate change is undoubtedly the most serious.

However, the response to climate change in fiction has been said to be so inadequate as to be almost non-existent. In 2005, writer Robert Macfarlane argued that climate change “does not yet, with a few exceptions, exist as art. Where are the novels, the plays, the poems, the songs, the libretti, of this massive contemporary anxiety?”(guardian.com). Eleven years later, in 2016, Amitav Ghosh expressed the same concern in *The Great Derangement*:

In a substantially altered world, when sea-level rise has swallowed Sundarbans and made cities like Kolkata, New York and Bangkok uninhabitable, when readers and museumgoers turn to the art and literature of our time, will they not look, first, and most urgently, for traces and portents of the altered world of their inheritance? And when they fail to find them, what should they – what can they – do other than to conclude that ours was a time when forms of art and literature were drawn into the modes of concealment that prevented people from recognizing the realities of their plight? (16).

On the other hand, it seems simply wrong to declare that fiction that concerns itself with climate change does not exist – in fact, works explicitly on this topic can be found as early as the 19<sup>th</sup> century. Lord Byron’s poem *Darkness*, inspired by the disastrous cooling of the climate during the famous “year without a summer”, describes a world where the Sun is extinguished, leading to famine and death. Jules Verne’s *The Purchase of the North Pole*, published in 1889, tells the story of a project to tilt the Earth’s axis, making it easier to mine and sell the coal that is believed to lie under the ice in the North Pole, which presents the theme of ruthless capitalism that is more than relevant today. This is not to mention the ancient Deluge narratives that are found in numerous civilizations. As for contemporary works, fiction that concerns itself with climate change has become widespread enough to inspire the term “cli-fi”, which Margaret Atwood defines as “books in which an altered climate is part of the plot” (Atwood 2013).

Yet it is not easy to dismiss the argument that climate change fiction is not nearly as pervasive as one could expect. Nor is it difficult to find works in which the issue is not treated with the seriousness it deserves, or those that Kim Stanley Robinson describes as “so didactic, so obviously meant to warn and teach us, that they no longer work as fiction” (*Everything Change* 8). On the other hand, great works of art may be criticised for losing sight of their message. In all cases, however, they can provide revealing insights into society’s approach to the issue of climate change (Clode and Stasiak, 2014). For this reason, this thesis aims to examine a diverse sample of contemporary works of Anglophone literature that focus on climate change and discuss the way contemporary fiction responds to the issue. It aims to determine how these works address the issue, how (and if) they make it artistically compelling, and examines the approach towards climate change that these works reveal.

**Relevance of the Thesis.** As mentioned above, literature has been criticised as having failed to adequately respond to the looming crisis of climate change. Many of these criticisms seem to assume that literature on climate change is either non-existent, or incapable of addressing the issue with the seriousness it deserves, or artistically ineffective. However, these assumptions ignore the fact that there is a growing body of literary works that deals explicitly with climate change (and that this subject is by no means new) and fails to examine why the existing works are seen as less serious than the subject demands and/or artistically unsuccessful. It also fails to examine the manner of thinking about climate change that is revealed and strengthened by these narratives. Therefore, instead of discussing a specific climate change-related aspect of a particular work, this thesis aims to take a broader look at a diverse sample from the existing body of climate change fiction and examine what it reveals about the approach to climate change in Anglophone literature, how it addresses the issue, and whether it presents an artistically compelling work.

**Object, Aim, and Structure of the Thesis.** The thesis will examine several works that will be referred to as “climate-change fiction”. This definition is kept purposefully broad in order to examine a wide range of works that are set both in the present and the future, have elements of both realism and science fiction, deal with the issue of climate change both explicitly and implicitly, and are aimed at different audiences. Several works of children’s literature will also be examined as a source of common climate change fiction clichés and a source of inspiration for different ways of presenting the issue. The thesis will examine the following works: *Flight Behaviour* by Barbara Kingsolver; *The State of Fear* by Michael Crichton; *Solar* by Ian McEwan; *The Carbon Diaries: 2015* by Saci Lloyd; *MaddAddam* by Margaret Atwood; and *Windup Girl* by Paolo Bacigalupi, as well as the short stories “Shooting the Apocalypse” and “The Tamarisk Hunter” by Paolo Bacigalupi, “A Hundred Hundred Daisies” by Nancy Kress, and “The Mutant Stag at Horn Creek” by Sarah K. Castle from the anthology *Loosed Upon the World*. It will also examine these works of children’s

literature: *The Lorax* by Dr Seuss; *The Tantrum that Saved the World* by Megan Herbert and Dr Michael E. Mann; *George Saves the World by Lunchtime* by Dr Jo Readman; *The Trouble with Dragons* by Debi Gliori; and *Where's the Elephant?* by Barroux. The thesis will focus on English-language fiction by mainly American, British, and Canadian authors.

These works will be discussed in separate sections, focusing on these aspects:

1. How the authors respond to the fact that the issue has been heavily politicised (at least in the USA), i.e., do they examine the attitudes and uncertainties implicit in the subject or avoid them;
2. How the relationship between scientific facts and fiction is examined;
3. How the relationship between the human and the non-human is examined;
4. How climate change is presented in science fiction;
5. How climate change is presented in teenage fiction;
6. How climate change is presented in children's literature.

As the works are discussed, the main aim will be to answer three questions: how these works address the issue of climate change in fiction; whether they make it artistically compelling; and what attitudes towards climate change they reveal. These questions will be discussed in more detail in the following sections.

## Climate fiction

The very first task of this thesis should be to define the term “climate fiction”, for it can be used to refer to significantly different types of literature. The OED features an entry for “cli-fi”, a term that is described as “a genre of fiction that deals with the impacts of climate change and global warming”, explaining that it is “short for climate fiction or climate change fiction, on the pattern of sci-fi” and originated in the early 21<sup>st</sup> century (Oxford Dictionaries | English, 2019). On the other hand, Caren Irr argues that 21<sup>st</sup> century climate writers “have brought distinctive types of speculative and science fiction, as well as satires of climate change activism and new hybrid realisms, under the cli-fi umbrella”, and notes that despite these differences climate fiction is “resolutely contemporary” (Irr, 2017). Andrew Milner and J. R. Burgmann argue that climate fiction is not in fact a genre in itself, but a sub-genre of science fiction, because it follows the science fiction tradition and provides a central role for science and technology. However, they also argue that this sub-genre is much older than the beginning of the 21<sup>st</sup> century, and distinguish different types of climate fiction according to its cause, namely anthropogenic, xenogenic, and geogenic climate-change works (Milner, Burgmann 2018). As we can see, two main disagreements emerge: whether climate fiction is a separate genre, a subgenre, or several genres; and whether it is a new phenomenon or a continuation of a long tradition. To gain a deeper understanding of this argument, it would be useful to look at the history of literary works that deal with climate change.

Danielle Clode and Monika Stasiak helpfully provide the following categorisation (Clode and Stasiak, 2014). They begin with a “pre- and early-scientific” period, which consists of various myths dealing with climate change. Perhaps the most common of these is the myth of the flood, which, according to the *Oxford Companion to World Mythology*, is found all over the world and represents “the given culture’s ‘dream’ of rebirth, recreation, and renewal from the chaotic maternal waters” (138). These myths can also include fires, storms, the disappearance of the sun and endless winter, such as the *Fimbulwinter*, and other climatic catastrophes. All of these mythologies feature the themes of “punishment and redemption, apocalypse and end-of-days” (Clode and Stasiak, 4). Although the myths describe the end of days as in some way brought on by the gods, it is important to note that they imply that humankind is responsible. Jean-François Mouhothe, for example, notes that the Bible emphasizes “human responsibility for environmental degradation and lay out the accompanying punishment: ‘The time has come... for destroying those who destroy the earth,’ (Revelation 11:18)” (2012).

The pre-scientific period is followed by the early climate-change representation period (1800–1930) in which “climate change, as a concept, was relatively rapidly accepted, but the causes of that climatic change took longer to establish” (Clode and Stasiak, 5). This period is characterised by works describing catastrophic climate change caused by comets, the cyclical weakening of the sun, the oscillations in the earth’s axis, technology, and other causes. This period includes the famous “year without a summer” and the two works that brought so much attention to it, Byron’s *Darkness* and Mary Shelley’s *Frankenstein*. It is interesting to note that *Darkness* does not seem to suggest any cause whatsoever, and refers to the ordeal as a “dream which was not all a dream”, while *Frankenstein* does not even mention climate change explicitly, although its themes and even the story of its creation are undeniably affected by the climate change (Townsend, 2016).

In the middle of the 20<sup>th</sup> century, according to Clode and Stasiak, climate-change fiction was scarce, mostly because fiction tended to reflect the contemporary fears, the most pressing of which was the threat of nuclear destruction (6). However, just a few years before the first atomic bomb was used, the Great Plains in the USA and Canada saw a period of powerful dust storms that became known as the Dust Bowl. This ecological crisis was reflected in both fiction, e.g., John Steinbeck’s *The Grapes of Wrath* and popular culture, e.g., Woody Guthrie’s *Dustbowl Ballads*. Despite its humorous tone, Guthrie’s “So long, it’s been good to know yuh” can be seen as no less apocalyptic than works dealing with nuclear destruction. Although the ecological causes of the crisis are not explicitly discussed in the art works that depict the Dust Bowl, they arguably could still be seen as prominent works of climate fiction, as the ecological crisis is undeniably a fundamental part of their story. It is also interesting to note that the story of the Dust Bowl still influences popular culture today – for example, in Christopher Nolan’s film *Interstellar*, which features a scene with the actual survivors of the Dust Bowl describing their experiences (Rosenberg, 2014).

Finally, a new period, which Clode and Stasiak date from 1960 to the present, is characterized by stories of man-made climate change finding their way into fiction. During this period, human influence on climate was demonstrated with ever less doubt, leading to the coinage of the term “Anthropocene”, used to refer to a geological age characterised by collective human influence on the planet (britannica.com). Although the term is yet to be officially approved, its influence in the field of literature can already be seen in the variety of critical works featuring the term in their title. Crucially, this is the period in which the causes of climate change are understood to be in large part cultural. As Adam Trexler and Adeline Johns-Putra argue, “climate change now occupies a primary position not just on political and scientific agendas but in the wider cultural imagination” (185). This can be seen in the invention of various variations of the term Anthropocene: anthrobscene (by Jussi Parrika, referring to the age of the media); capitalocene (by Jason W. Moore, referring to the capitalist

modes of thinking); anglocene (by Christophe Bonneuil and Baptiste Fressoz, emphasising the carbon emissions of the USA and the UK in the 19–20<sup>th</sup> centuries); and even misanthropocene (by Raj Patel) and necrocene (by Justin McBrien), referring respectively to the hatred of humanity in view of climate change and the widespread extinction that defines our times.

What these new coinages reveal, above all, is the understanding of the unique position of modern humanity in view of climate change. The causes and consequences are finally understood, and yet nothing is being done. What results is the anxiety and confusion stemming from simultaneously being the victim and the perpetrator, and a search for a response: blaming our culture (anthrobscene and capitalocene), blaming other people (anglocene), blaming ourselves (misanthropocene), or simply lamenting the loss (necrocene). All these responses and more can undoubtedly be found in literature. However, I would argue that these preoccupations do not truly appear in the literature of the pre-scientific and early climate change representation period. These early stories describe the wrath of angry gods or obscure, unpredictable threats such as comets or the disappearance of the sun instead of the clear, predictable and inevitable threat that humanity poses to itself, and do not examine the causes and consequences of such an inexplicable situation. Having said that, it would be wrong to insist that the pre-20<sup>th</sup> century narratives on climate change have no influence on climate-change fiction today. For the purposes of this thesis, then, I will consider “climate-change fiction” to refer to late 20<sup>th</sup> – early 21<sup>st</sup> century works that in some way include the changing climate as part of the plot, but will not refrain from examining the influence of previous climate-change narratives.

With the understanding that climate change is caused by humans and the reasons for their dangerous behaviour are in some part cultural comes the belief that if the causes of climate change are cultural, so should be the solution. Therefore, literature is expected if not to change behaviour, at least to provide a narrative to understand and find our way in this changing world. It is a difficult task, and hardly suitable for a single genre, let alone a subgenre. It has been suggested by many theorists and writers (Caren Irr, Adam Trexler, Amitav Ghosh, Margaret Atwood, Kim Stanley Robinson, to name just a few) that climate fiction is not a single genre but rather a multi-genre literary response to the changes in climate. As the variety of works listed in the introduction suggests, the same stance will be taken in this thesis.



## “Serious” Climate Change Fiction

In the very beginning of *The Great Derangement*, Amitav Ghosh laments the faith of fiction that describes climate change:

“Indeed, it could even be said that fiction that deals with climate change is almost by definition not of the kind that is taken seriously by serious literary journals: the mere mention of the subject is often enough to relegate a novel or a short story to the genre of science fiction. It is as though in the literary imagination climate change were somehow akin to extraterrestrials or interplanetary travel.” (11)

This is not an unreasonable claim, bearing in mind that some theorists claim that climate fiction is only a subgenre of science fiction ([scientificamerican.com](http://scientificamerican.com)) and that the very term *cli-fi* is a derivation from the term *sci-fi*, which suggests a close connection. Although this is not always the case, it is telling that the only two exceptions to this trend that Ghosh was able to find are Ian McEwan’s *Solar* and Barbara Kingsolver’s *Flight Behaviour*, which are also going to be examined here.

The great majority of other climate fiction works are set in a sometimes undetermined and largely unrecognizable future, which is based on the social and technological trends of the present. This technique comes directly from science fiction, where the authors create a *novum*, a term coined by Darko Suvin (63). A *novum* is described as “by definition rational, as opposed to the supernatural intrusions of marvellous tales, ghost stories, fantasy and other genres of the fantastic... It is plausible in terms of historic logic, whether it be in the history of technoscience or other social institutions.” (Cambridge Companion to Science Fiction). Similarly, climate-fiction stories are usually based on present-day climate science.

However, as the phrase “this may seem like science fiction, but it’s true” reveals, science fiction is not synonymous with plausibility, and Ghosh is right to believe that a literary work associated with science fiction will not be regarded as plausible and “serious” and to argue that this should not be the case. Yet it is also clear that plausibility does not necessarily determine the seriousness of the work. To take *The Metamorphosis* for an obvious example, the scientific improbability of waking up in the body of an insect does not diminish the importance of the story; so it seems reasonable to argue that climate-change fiction can be expected to be “serious” even if it does include extraterrestrials and interplanetary travel.

These inconsistencies reveal that there are two kinds of plausibility that a climate-change fiction work may or may not have: scientific plausibility and fictional plausibility. Let us discuss them

in turn, beginning with scientific plausibility. It is normal to expect that a literary work that discusses climate change will be based on real climate science and that most authors will have conducted considerable research before composing their work. However, as Michael Crichton convincingly demonstrates in his novel *The State of Fear*, a considerable part of the public would not be able to debate the details of climate science, and by extension could not determine whether or not the plot of any given climate change work is scientifically plausible or not. Of course, climate-change fiction may be a good way to tackle our ignorance and by extension incite us to change our behaviour. But wouldn't non-fiction be much better suited for this purpose? There are numerous non-fiction books and articles on climate change released every year with the aim of informing and inciting to act, and there seems to be no need for fiction to be doing the same. It can be argued therefore that providing accurate scientific information is not (or at least not the most important) function of fiction. A good example are stories narrated through children or teenagers, in which the characters' simple, childish understanding of the events around them and lack of any scientific explanation do not make the story any less engaging or powerful. Nancy Kress' short story *A Hundred Hundred Daisies* can be mentioned here, as well as Sacy Lloyd's teenage novel *Carbon Diaries*, which will be examined in more detail later.

What, then, is the function of fiction? To avoid long philosophical discussions let us simply take the position that a literary work should create an imaginary world that is compelling because it is internally consistent and follows the rules that make it plausibly in fictionally plausible (Harris, 1952). Its purpose, then, is not to inform or provide solutions, but to narrate experience, or, as Jerome Bruner put it, to provide a "comprehension of plight that, by being made interpretable, becomes bearable" (16).

On the other hand, having mentioned *The State of Fear*, it is crucial to note that it is a novel that denies climate change. Despite the overwhelming scientific evidence to the contrary, climate change is still being fiercely debated, especially in the USA, and it is obvious that fiction is seen as a useful tool for both sides. So, for the purposes of this thesis, it is necessary to determine if novels that deny climate change will be considered "serious". It is difficult to provide a straightforward answer. Fiction is better suited to narrate human experience than to present and examine scientific evidence, and if a work is an artistically compelling, fictionally plausible, complex narrative that happens to describe the experience of someone who does not believe in climate change, it should not be dismissed on the grounds of its position. However, I have not come across any works that meet these requirements. Yet it is also possible that personal position on this issue can strongly influence one's approach to the work, i.e. a work that has a position that is contrary to the reader's will automatically be seen as "not serious". For this reason, it is interesting to examine works that address the climate

change debate from the point of view of both sides. A work like that would most likely be a realist work set in the present rather than a utopia or dystopia set in the future, and it could be suggested that this is what Amitav Ghosh expected from a “serious” climate-change work. Sadly, it seems that most climate-change works are set in the future precisely because the authors want to avoid the debate. However, three works that do discuss it (Barbara Kingsolver’s *Flight Behaviour*, Ian McEwan’s *Solar*, and Michael Crichton’s *The State of Fear*) will be examined here, along with further questions of climate change politics.

So far, it has been determined that climate-change fiction will be considered to be serious regardless of whether or not the work is realistic and whether it is set in the future or in the past, as long as it is artistically compelling and fictionally plausible. It has also been said that scientific accuracy and political stance will not be considered as straightforwardly determining if a work is serious or not. One more issue should be examined here: the issue of underlying assumptions in climate-change fiction.

Caren Irr claims that “Although cli-fi is resolutely contemporary and dedicated to creating new narratives adequate to current conditions, criticism devoted to the genre has carefully documented the persistence of national, masculinist, and anthropocentric tendencies in some of its major works.”(2). In other words, the underlying cultural tendencies that possibly contributed to the climate crisis are clearly reflected in the literary works that describe climate change; what is more, these tendencies often go unexamined. Even more importantly, they are often seen as unavoidable. This idea is interestingly presented in Charlie Jane Ander’s “The Day It All Ended”, a short story published in the self-described climate-change fiction anthology *Loosed Upon the World*. It is a rare example of an optimistic climate-change fiction story, in which the world is saved by carbon-capturing devices which are marketed and sold to people as wasteful, energy-consuming yet trendy products. As the businessman who sold them explains, people did not want environmentally friendly products, but after they had been told the devices were wasteful, “everyone wanted two of them” (416). This story poses an interesting question, also mentioned by Irr, namely, why is it easier to imagine the end of the world than the end of capitalism (4)? Clearly, a literary work that attempts to answer this question should be seen as much more “serious” than one that does not.

An example of a story that does not examine any of the old attitudes could be Jean Louis Trudel’s *The Snows of Yesteryear* from the aforementioned anthology. In it, a male protagonist rescues a scientist, stops a shadowy meeting of greedy developers, and discovers an “ice-forming bacteria” (108) that will help solve all the problems of a warming climate; upon return, he is met by a dark-eyed female character whose only purpose in the story is to admire him. Although the story does ostensibly discuss climate change, it is clear that if climate change were substituted with whatever

other villain the author might choose, the story would not change significantly. Naturally, stories like this will not be considered “serious” climate-change fiction, and could arguably not be called climate-change fiction at all, as they don’t seem to differ significantly from any other generic thriller.

### Artistically Compelling Climate-Change Fiction

One of the questions posed in the introduction was how and if the issue of climate change is made artistically compelling in the works that will be discussed later in the thesis. To answer this question it is necessary to have some sort of measure of what an “artistically compelling” work is or to provide guidelines that could help decide if a work is artistically successful or not. Of course, such a task would be impossible to carry out and by definition limiting because it would imply that anything outside these guidelines couldn’t be considered a good work of fiction. Therefore, I will focus instead on why this question was posed at all.

It has been rightly noted that the issue of climate change seems strangely resistant to narration in fiction. One example of this, discussed by Alexa Weik von Mossner, is that of James Hansen’s science fiction story in his book *Storms of My Grandchildren*. As Mossner explains, although the story has the good intention of helping us imagine the impact of our current actions on those who will live with their consequences in the future, it “ends up being so far-fetched and its protagonists so bloodless that it seems unlikely that it will engage readers’ imaginations and emotions in the intended way”(85).

There are two important criticisms in this quote. The first is that the story was too “far-fetched” and the second that its characters were “bloodless”. Both of these reveal important problems, so let us look at them in turn.

First, Mossner argues that the story is “far-fetched”. As Hansen is a climatologist, it is probably safe to assume that the story is not “far-fetched” from a scientific point of view. What Mossner most likely means is that the story is far-fetched in terms of fictional plausibility rather than scientific plausibility. So the question is why do events that are scientifically plausible and even probable seem as too “far-fetched” for a fictional story? Ghosh suggests that “probability and the modern novel are in fact twins, born about the same time... to work as vessels for the containment of the same kind of experience”. Modern novels, he suggests, are incompatible with drastic, unprecedented events. Before the modern novel, however, fiction “delighted in the unheard of and

the unlikely”(17). His suggestion, therefore, is that the modern novel is inherently unsuitable to narrate climate change. It is a drastic position, but one based on sound arguments. However, before declaring that the novel is destined to fail as a literary form, it would be useful to look at how contemporary climate-change fiction works tackle this problem of probability. This question will be addressed when discussing each of the works listed in the introduction.

The other criticism Mossner presents is that the characters in Hansen’s story are so “bloodless” that they fail to engage the readers’ imaginations and emotions. Again, Ghosh touches upon this issue as well, arguing that the modern novels are ill-suited to narrate changes that are the effect of collective actions and manifest themselves through ages rather than short periods of time. The novel, he argues, is set in a limited space and time, and focuses on the individual rather than the collective. However, unlike with probability, Ghosh does not believe that this feature is inherent in the novel: “I do not think that this turn in contemporary fiction has anything to do with the novel as a form: it is a matter of record that historically many novelists from Tolstoy and Dickens to Steinbeck and Chinua Achebe have written very effectively about ‘men in the aggregate’. In many parts of the world, they continue to do so even now.” (53). But the problem of narrating changes that span generations remains: for example, Mossner also criticises Dale Pendell’s *The Great Bay*, in which the narrative spans 14,000 years. The novel is unsuccessful, she argues, because “its human protagonists are no more than brief and unimportant occurrences that leave readers cold, and for the most part disinterested in their fates” (88). Thus the challenge of portraying changes that may develop through long periods of time while keeping the readers concerned for the protagonists of the story remains. The novels in this thesis will also be discussed from this perspective.

The third issue with climate-change fiction is related to the balance between the work’s artistic merits and the ideas that it tries to convey. Clode and Stasiak argue that criticism of climate-change fiction is often focused on its message: when stories “deliver the climate change message in detail they are often criticised for being too polemic, for lacking a story and for being poorly written. When they focus on story to the detriment of the climate change message, they are criticised for lacking specificity or accuracy” (4). The problem here is that for climate-change fiction, conveying a certain message or inciting a certain type of behaviour seems to be considered obligatory; however, art that seems to focus above all on promoting a certain idea is often unsuccessful. There are, of course, many exceptions, especially the numerous feminist or anti-racist works. The balance between conveying a certain message and maintain artistic merits will also be addressed when discussing the works listed in the introduction.

Finally, let us return to the science fiction story by James Hansen. It is worth noting that *The Storms of My Grandchildren* is a non-fiction work, and Hansen is a scientist, not a writer. Why then

did he feel it was necessary to add a science fiction story to his book? His decision reveals a belief that fiction can provide something more than plain science. This betrays a need to present scientific data in a different way, to find a literary form and language in which to convey scientific findings to make them relatable in a more profound way. That, above all, is what I will be looking for in climate-change fiction.

### What Climate-Change Fiction Reveals About Our Attitudes towards the Human and the Non-Human

Despite the criticism for apparent lack of climate-change art, it is clear that there is a substantial body of climate-change literature which is likely to grow in the future. Regardless of the genre, intended audience or even the quality of the works, they can all provide illuminating insights into our approach to climate change.

To be precise, by using the word *our* I am referring to the attitudes in English climate-change fiction, i.e. those of mostly American, British or Canadian readers and writers. These attitudes might not be universal, but, bearing in mind that the current era has been referred to as the *anglocene* due to the disproportionate contribution to carbon emissions by the UK and the USA in the 19<sup>th</sup>–20<sup>th</sup> centuries, they are certainly worth examining. There are many insights that can be gained from climate-change fiction, but for the purposes of this thesis I would like to focus on the following.

As Ghosh rightly notes, modern novels often focus on the individual rather than on large groups of people (with notable exceptions), which makes it more difficult to discuss the collective human impact on the planet (54). Therefore, I will examine how (or if) the chosen works discuss the problem of individual and collective impact in both harming and protecting nature and how their characters respond to being both the perpetrators and victims of climate change.

Another issue that is often the focus of eco-critical reading is the attitude towards non-human nature. Despite the fact that the philosophy and social movement of deep ecology appeared as far back as 1973 (Dregson), it is worth examining how much have our attitudes towards non-human species and the environment in general really changed.

Bearing in mind that a large part of climate-change novels are set in the distant future, it is also worth examining the predictions they make. Works set in the future clearly reveal what the author perceives to be the current social, environmental, economic and political trends and the results that

may have in the years and ages to come. These insights also reveal the prevailing mood concerning the future, which is reflected in the choice between writing a utopia or a dystopia. It is also worth looking at how and if human nature is expected to change in response to the great changes that await in every aspect of the future.

Finally, the last part of the thesis will focus on how climate change issues are presented in children's literature. As children's literature is much more likely than adult literature to be regulated and even banned for promoting certain ideas, it is interesting to examine what views on climate change are conveyed through children's literature. The knowledge that our children will most likely bear the worst consequences of climate change and the guilt coming with that knowledge is also worth examining.

### The Works Chosen and the Structure of the Thesis

The final question to address before beginning this thesis is the rationale in choosing the particular works listed in the introduction. As discussed before, climate-change fiction can be considered more than just a genre, and has been called a "multi-genre response" to the phenomenon of climate change. For this reason, it is difficult to choose a sample of works that could be called representative. It is also difficult to choose the works that could be considered the most outstanding examples of this type of literature. Therefore I will not attempt either, but focus instead on the works that could be considered representative of certain issues concerning climate-change fiction. Each issue will be discussed in a separate section.

The first section will focus on the way climate change has been politicised and turned into a partisan issue. This section will discuss Barbara Kingsolver's *Flight Behaviour* and Michael Crichton's *The State of Fear* as two works that portray climate change denial in very different ways. It will also discuss Ian McEwan's *Solar* as an unlikely response to climate change by satire. The three are also discussed together as examples of climate-change fiction stories set in the recognisable present and hardly similar to science fiction.

The second section will focus on the relationship between facts and fiction as it is expressed through the characters' point of view. It will also discuss the human approach to the non-human and how it changes in the face of climate change and great scarcity of resources that had once seemed infinite. It will discuss four short stories from the anthology *Loosed Upon the world*: "Shooting the

Apocalypse” and “The Tamarisk Hunter” by Paolo Bacigalupi, “A Hundred Hundred Daisies” by Nancy Kress, and “The Mutant Stag at Horn Creek” by Sarah K. Castle.

The third section will examine climate-change fiction that is very similar to science fiction and discuss what can be gained from the combination of the two genres. It will discuss Margaret Atwood’s *MaddAddam* trilogy and Paolo Bacigalupi’s *Windup Girl*.

The fourth section will discuss Saci Lloyd’s *Carbon Diaries 2015* as an example of a teenage novel, which, like science fiction, is almost by definition not “serious” and examine how it incorporates the subject into this literary genre and what insights can be gained from this combination.

Finally, the last section will focus on children’s literature and discuss several works. It will mainly comment on how the issue of climate change is present for the youngest readers and how our approach to climate change is reflected in these books.

Apart from the final section, the thesis mainly focuses on novels. Novels have been said to be inherently unsuitable to narrate climate change and at the same time are the most widely read type of literature; for this reason, it is necessary to examine the issues and solutions of narrating climate change that they present. Children’s literature, on the other hand, can be seen as both adopting the clichés of adult literature and presenting fresh ways of portraying climate change, which is why it will also be examined here.

### Truth, Politics and Climate Change

In his book *Anthropocene Fictions*, Adam Trexler presents two important problems in the relationship between climate-change fiction and scientific facts. The first problem concerns the way this type of fiction should be *interpreted*. He argues that “either the novels should be read as more or less factual representations of the scientific phenomena of climate change, or they should be read as cultural texts that represent the collective imagination about global warming” (Trexler 34). However, he later points out that there are serious problems with both of these approaches.

The second problem concerns the way these works should be *written*. What choices does the author have to make to incorporate science into fiction? As Trexler puts it:

Which set of predictions should the novelist follow? Should the novel be set in the near future, when changes may be harder to discern, or in a distant, harder-to-predict future, when changes might be undeniable? Which threats are more serious or more likely?... Beneath all of these choices lies an even more fundamental problem: the way science enters fiction. The issue gets to the heart of what it means for science to be true and what it means for fiction to be distinguished from fact (29).



The first problem – that of how to read and interpret climate-change fiction – will be discussed in a separate section. In this section, I would like to focus on the second problem, namely that of incorporating science into fiction. Although it is difficult in and of itself, it is made much more so by the lack of complete certainty in scientific predictions and the way the issue of climate change continues to be fiercely politicised. The only reason an author has to debate which scientific predictions to follow is because he or she cannot be certain; the only reason to set a novel in a future when climate change is undeniable is because it is so often denied today. In other words, the problem is not just how to incorporate science into fiction but also how to incorporate scientific predictions, which can never be certain enough to be called facts, into fiction, which is by definition something other than fact, and to do all of this in a society where every fact can be politicized and contested.

A good example of how climate change is politicized is a recurring scene in Michael Crichton's *The State of Fear*. As the all-knowing protagonist Kenner provides irrefutable evidence that the world is not in danger of imminent and irreversible climate change, people react with anger, denial and withdrawal rather than relief or joy (483). Why would the response to learning that your biggest fear is unfounded be anger? Yet this scene is probably recognisable to most readers. Although Crichton's science is in no way accurate, he provides a valuable insight that in climate change debates, the truth becomes secondary to the need to win the argument.

This poses interesting questions for the authors who do decide to set their work in the present or near future rather than the distant future. To add a few questions to those posed by Trexler: if the work is set in the present or near future, how will it be depicted? Will there be grand tragedies or small, subtle changes? Will the changes be presented by an authorial figure, such as a scientist, or from the point of view of a character with limited knowledge? Will there be characters who deny climate change, and if so, will they be turned into superficial caricatures or complex people with plausible and complicated reasons for their beliefs, and what reasons will these be? And if they are complex and relatable characters, will that add credence to climate change denial? Will the works focus on science or human nature? In this section, I will discuss three novels that are set in a recognisable present, namely Barbara Kingsolver's *Flight Behaviour*, Ian McEwan's *Solar*, and Michael Crichton's *The State of Fear* and examine how the authors approach these issues.

#### *Flight Behaviour* by Barbara Kingsolver

Barbara Kingsolver's *Flight Behaviour* is rather unusual for a climate change novel. Firstly, it is one of the few climate-change fiction works that is set in a recognisable present. Secondly, the plot

revolves around an event that is not a straightforward catastrophe: a colony of Monarch butterflies, instead of making their way to their usual roost sites in Mexico, suddenly appear in a forest in Tennessee. As Trexler puts it, “In the majority of climate change novels, a local disaster makes global warming undeniable and immediate, rupturing quotidian life and suppressing questions of belief. By contrast, this flood of orange wings makes climate change gently, gorgeously palpable” (227). Unlike floods, draughts, or hurricanes, the event is, as Trexler rightly notes, gorgeous, but in being so arguably does not make climate change palpable. The significance and impact of this event in the novel are not immediately clear, leaving open the possibility for various interpretations.

In fact, upon seeing the butterflies for the first time, the protagonist Dellarobia is struck so much by their beauty that she immediately ascribes a deeper significance to it: “A valley of lights, an ethereal wind. It had to mean something” (17). At first, she interprets it as a sign from God sent to stop her from committing adultery; later on, as her family learn about the butterflies, they try to convince the local community that what they are seeing is a miracle (57). The butterflies bring change into Dellarobia’s life, and she sees them in a mainly positive light: “Miracle or not, this thing on the mountain was a gift. To herself in particular, she’d dared to imagine” (80). In many respects, it probably was. The sight of the butterflies stops Dellarobia from committing a reckless affair; it brings the family a lot of attention (albeit not always pleasant) and additional income as tourists flock to see the butterflies; and ultimately it brings big changes to Dellarobia as she decides to leave her safe but unpassionate marriage and life of domestic chores to seek higher education. It is also worth mentioning that the butterflies and the attention they bring stop Dellarobia’s father-in-law from logging the forest, which might have prevented disastrous floods and landslides. Meanwhile, the local church and news team see the butterflies as a miracle and a fascinating story, respectively. All of this reveals the different side of climate change, reminiscent of the myth that climate change can have positive effects such as the northern hemisphere being able to enjoy all the benefits of tropical weather.

It takes a migrant family from Mexico that used to make a living by taking tourists to see the Monarchs’ nesting sites to make Dellarobia begin to comprehend the darker side of the event. With the arrival of the charming and knowledgeable scientist Ovid Byron and his team, Dellarobia finally begins to see the true significance of the butterflies. However, at least at first the scientific explanation is not widely known, as the scientists stay away from public debate. As Ovid puts it: “Terrible, beautiful, it’s not our call.... We are scientists. Our job here is only to describe what exists.” (114). Interestingly, Dellarobia “knew to be wary of” explanations involving climate change, and “wondered if any of this was proved”. Yet she opts to believe in the scientists. The reason for this may be that she is impressed by what she sees as their superiority: their education, incomprehensible yet

impressive scientific jargon, good looks and manners. Or it might simply be because for the first time she hears a more viable explanation because normally “in her experience, conversations of this nature always ended with the same line: The Lord moves in mysterious ways” (115). However, as Dellarobia tries to explain Ovid’s point of view to her husband Cub, she knows that “Cub would not be disposed to this way of thinking, any more than the people in town or Tina Ultner [a news presenter] and her national broadcast audience. All were holding out for the miracle angle. Honestly, it made a better story” (199).

As we can see, instead of making climate change “palpable”, the arrival of the butterflies produces a variety of explanations and interpretations, and instead of looking for the truth, people opt for “a better story”. “The people” here could also include Dellarobia – she is choosing to believe the scientists’ story not so much because of being given indisputable evidence (and even if she had, her lack of expertise would prevent her from making judgements), but because she is attracted to Ovid. The scientists also provide a refreshing alternative to the views of her family and community, which, it is important to remember, she was ready to abandon at the very beginning of the story.

It is also interesting to note the language of possession that is being used. Dellarobia thinks of the butterflies as a gift, although “not once had she considered it might have been stolen from someone else” (80). It is interesting to note what the word *stolen* reveals about Dellarobia’s attitude towards the butterflies: they are a beautiful, prosperity-bringing phenomenon that may be someone’s possession. This idea of possession develops throughout the novel. At first, Dellarobia sees the butterflies as being “hers”; after hearing the Mexican family’s story she is upset about “her” butterflies being “stolen” from someone else; and finally, as Ovid and his team describe their concerns about the changed migration pattern, she is overcome by sadness because “These people [the scientists] had everything. Education, good looks, boots whose price tag equalled her husband’s last paycheck. Now the butterflies were *theirs* too” (115) (italics mine). Read from an eco-critical point of view, this could be said to show an alarming assumption that the butterflies can be given as a gift, stolen, and taken possession of, turning them to nothing more than a commodity.

On the other hand, by saying that the butterflies were “theirs”, Dellarobia means something other than simple material possession. She points out an important problem: even though the poor are affected by the impact of climate change more than the rich, they are not allowed to narrate these events on their own terms. As Dellarobia put it, “she didn’t have a nice little expensive backpack. She didn’t have a nice little college education, either. She’d just have to let the smart people figure this one out” (115). The butterflies produce a competition of stories, but the stories of the poor local community, just like their homes, cars, and backpacks, are seen as less valuable.

All of this reveals that deciding whether or not to accept the fact of climate change depends not so much on evidence as on constructing – or choosing – a certain narrative. What’s more, these narratives are not individual, but collective, and are strongly tied to one’s identity and social class. As Dellarobia explains: “These positions get assigned to people... If I’m the redneck in the pickup, fine, let me just go burn up some gas” (246). In their book *Communicating Climate Change*, Anne K. Armstrong, Marianne E. Krasny and Jonathon P. Schuldt conduct social experiments and come to the conclusion that “people avoid beliefs that might alienate them from their chosen group as a means of protecting their sense of self” (45), thus confirming Dellarobia’s view.

Why, then, does Dellarobia side with the scientists? A simple answer is that she does not want to be part of her community. She does not love her husband and more than once considers committing affairs that would end her marriage; she feels unwelcome in her husband’s family; she refuses to join her family in church; and, crucially, in the end decides to leave her husband and seek higher education, effectively distancing herself from both her community and her social class.

It is interesting to compare these views on truth with those expressed in another novel by Kingsolver, *The Poisonwood Bible*. In this story of a missionary family in the Belgian Congo, Kingsolver also questions truth. Anne T. Salvatore describes it thus:

Rather than assuming a single Truth, Kingsolver evidently situates herself with some feminist theorists (e.g., Simone de Beauvoir) and with many modern and postmodern philosophers (e.g., Jean-Paul Sartre and other existentialists) who dispute the notion of objective Truth... Kingsolver actually celebrates the beauty of individual perception instead. In fact, she incorporates a deeply feminist approach to truth by demonstrating how the use of several perspectives works better than attempting to house all Truth – and power – in a single individual (or country) (163).

How does this approach work when discussing climate change? It seems that Kingsolver questions her own notion of relative truth through the character of Ovid. Ovid clearly represents a rationalist view of the world, one in which human interpretations and narratives have little impact on reality, and scientists are best positioned to find what could be called *the* truth. The fact that he is seen as an overall positive character (he is described by Dellarobia as a “man who could probably charm a snake” (98), a “gentle teacher” (269), and “the one man whose good opinion she worked hardest to earn” (192); he later becomes her love interest) reveals that his stance is not subject to criticism. However, Kingsolver does draw attention to his blind spots. As Dellarobia explains why locals see themselves as “rednecks” and therefore want to “burn up some gas”, Ovid does not understand: “Ovid seemed perplexed. Maybe he knew more about butterflies than people” (246).

It is this knowledge about people, rather than scientific knowledge, that is beautifully revealed in Kingsolver's novel. By choosing to revolve her story around an event that is not a straightforward disaster and incorporating different interpretations of it by characters who are never portrayed in a condescending way, Kingsolver manages to bring all of the complexity of grasping climate change into her story world.

However, it is useful here to remember Amitav Ghosh's apt simile of nature being a dog asleep on the carpet, serene and harmless, and then suddenly rising to bite you as you step on its tail (9). If I could extend this simile to Kingsolver's novel, I would argue that the natural world in it does not bite, so to speak. Kingsolver chooses a main event that is "realistic" and thus more compatible with the novel. It is interesting to compare it to actual "terrifying, gripping, uncanny" real-life news stories collected by journalist David Wallace-Wells: "a group of Arctic scientists trapped when melting ice isolated their research centre on an island also populated by a group of polar bears; a Russian boy killed by anthrax released from a thawing reindeer carcass that had been trapped in permafrost for many decades. At first, it seemed the news was inventing a new genre of allegory" (guardian.com, 2019). It seems truth is stranger than Kingsolver's fiction.

Although *Flight Behaviour* paints a complex and sympathetic picture of people struggling to come to terms with changes, it does not reveal just how unprecedented these changes really are. Because of this, it could be argued the novel proves Amitav Ghosh's claim that because of its focus on the inner life of an individual and its bourgeois predisposition towards the uneventful, the modern novel is fundamentally unsuitable to narrate change of this scope (26). On the other hand, it does highlight important issues of truth and belief and their relation to identity and social class. Some of these issues also come to the forefront of Michael Crichton's notorious novel *The State of Fear*, which will be discussed next.

#### *The State of Fear* by Michael Crichton

Michael Crichton's *The State of Fear* is important for two reasons: it is a rare example of a novel in which climate change is denied, and at the same time probably one of the most widely read climate-change novels. Interestingly, it is filled with charts, graphs and footnotes and seems to be bordering on non-fiction. A large part of the novel's critical reception also seems to focus on the facts presented rather than the fiction in which they were presented. What's more, the novel has often been treated as if it were non-fiction: the author was summoned to testify before the USA's Committee on Environment and Public Works (Trexler 36), and has received an annual journalism award from the American Association of Petroleum Geologists (Dean 2006). The fact that the association clearly

represents the oil industry shows that despite the author's stance against politicised science, the novel is used as a weapon in a highly politicised debate. It also seems that critics almost wilfully disregard the fact that this is a novel and not a journalistic piece or a scientific paper. All of which suggests that in this case, the message of the novel is more important than its literary qualities, which is why I will focus on the novel's overall message first.

The novel tells the story of Peter Evans, a lawyer for a rich philanthropist George Morton, and Morton's assistant Sarah Jones. After Morton's death, they meet two international law enforcement agents, John Kenner and Sanjong Thapa, who are on the trail of an eco-terrorist group called the Environmental Liberation Front. It is planning to artificially create disasters to convince people of the threats of climate change, and is working with another organisation that has received numerous contributions from Morton – the National Environmental Resource Fund, led by Nicholas Drake. Evans and Jones travel around the world trying to stop various plots by the ELF and in the process learn the unmediated, evidence-based truth about the hoax of climate change from Kenner.

As we can see, the novel focuses highly on the fight between a truth provided by a biased and self-serving establishment and an individual truth. This tension is visible both within the boundaries of the novel and in the external world. First, we have a novel that is often seen as belonging more to the genre of popular science than fiction (not to mention, the novel, a work of pure fiction, is for some reason considered equal to journalism) and is used in wildly politicised debates on climate change. Then, we have a plot that focuses on the figure of a single-minded hero (Kenner) who fights the evil establishment that takes advantage of public ignorance and distorts truth in order to achieve financial gain. From all this, it is clear that *The State of Fear* lays bare an interesting contradiction that characterises a postmodern world: distrust in what could be called official truths and unwavering belief in anything that contradicts them, no matter how little evidence there is to support it.

Adam Trexler claims that “instead of writing a novel with a realist or postmodernist sense of science, Crichton has created a thriller in which both sensibilities operate at the same time” (36). On the one hand, the protagonist Kenner clearly represents belief in objective scientific truth that exists regardless of interpretation. This stance is emphasised with the numerous footnotes and charts included in the novel, and by the list of resources that the author includes so that the readers can “arrive at their own conclusions” (583). On the other hand, Kenner also exhibits beliefs that could be attributed to what Pauline Vaillancourt Rosenau calls the “skeptical postmodernists” (15). Martin Kilduff and Ajay Mehra describe their views thus: “from the skeptical perspective... the world is so complicated that concepts such as prediction and causality are irrelevant. Everything is related to everything else so the search for causes or origins must be discontinued.” (455). Although Rosenau, Kilduff and Mehra discuss social sciences, it is clear that Kenner expands this view to the natural

sciences as well: “[Climate] is so complicated that no one has been able to predict future climate with accuracy. Even though billions of dollars are being spent, and hundreds of people are trying all around the world. Why do you resist that uncomfortable truth?” (248). The uncomfortable truth, of course, being that all climate science is simply guesswork and, as Kenner himself suggests on many other occasions, when it comes to explaining why certain climatic phenomena occur, “nobody knows”.

While it is not true that “nobody knows”, it is quite clear that at least one character doesn’t – Peter Evans, who could easily be interpreted as a representative of the average reader. He is mildly concerned about climate change, but can only describe it in the broadest possible terms:

[Evans] thought for a moment, choosing his words carefully. “Global warming is, uh, the heating up of the surface of the earth from the excess of carbon dioxide in the atmosphere that is produced by burning fossil fuels.”

“Again, not correct.”

“Why not?”

“Several reasons. At a minimum, I count four errors in the statement you just made.”

“I don’t understand,” Evans said. “My statement—that’s what global warming is.”

“In fact, it is not.” Balder’s tone was crisp, authoritative. “Global warming is the *theory*...”

“—hardly a theory, anymore—”

“No, it is a theory,” Balder said. “Believe me, I wish it were otherwise. But in fact, global warming is the *theory* that increased levels of carbon dioxide and certain other gases *are causing* an increase in the *average temperature* of the earth’s *atmosphere* because of the so-called ‘greenhouse effect.’ ”

“Well, okay,” Evans said. “That’s a more exact definition, but . . .”

“Mr. Evans, you yourself believe in global warming, I take it?”

“Of course.”

“Believe in it strongly?”

“Sure. Everybody does.”

“When you have a strongly held belief, don’t you think it’s important to express that belief accurately?”

Evans was starting to sweat. (80–81)

Clearly, the author’s intention here is to force the average reader to sweat as well. As the characters who believe in climate change are never given any footnotes with which to defend their position, the readers are expected to provide some themselves. Admittedly, many critics have done so, including Gavin Schmidt, a climate scientist whom Crichton visited while researching his book (Schmidt 2005). However, it is probably safe to assume that there were many other readers who could not defend this position with any precision, and these readers are being shamed for their ignorance and conformism, as they, like Evans, believe in climate change only because “everybody does”.

However, the author does suggest a remedy for this condition – self-education. As I have mentioned before, he even includes a reading list at the end of the book so that the readers could make

their own conclusions, despite the fact that it going through a list of cherry-picked data compiled by a clearly biased writer can hardly be considered objective research. The character Kenner suggests another way of achieving knowledge: “If you read their claims and counter-claims, you can’t be sure who’s telling the truth. But this is the Internet age. You can find the original documents and the list of changes online and decide for yourself” (246). In saying this, Kenner suggests two means of achieving real knowledge: first, by rejecting official accounts, because “their” (i.e., biased and untrustworthy officials’) explanations, which can only be described in polarised, aggressive terms (“claims and counter-claims”) cannot possibly be trusted; and second, by seeking truth through individual research and personally verified facts. He suggest such individual research can easily be carried out with the help of the internet, which he views as a trustworthy and unbiased source of knowledge. Needless to say, the “Internet age” also means that unreliable and false information can easily reach millions of people, making Kenner’s belief naïve at best. So, similarly to Kilduff and Mehra’s skeptical postmodernists, who “engage largely in critiquing existing work rather than undertaking new empirical approaches” (455), Kenner also instils distrust with any official sources of knowledge without presenting a viable alternative to them, other than to simply trust yourself (or him).

Kenner not only encourages distrust in climate science, but also perceives activists as gravely uninformed, hypocritical, and self-centred. The best example of this is his conversation with Ted Bradley, a rich actor who supports environmental action. After interrogating him and another activist actress on their lavish lifestyles, Kenner moves on to Bradley’s views on developing countries:

“But do you want all these people to have the same horrific, wasteful living standard that we do in America and, to a lesser extent, Europe?”

“I don’t see you giving it up.”

“No,” Ted said, “but I conserve where I can. I recycle. I support a carbon-neutral lifestyle. The point is, if all these other people industrialize, it will add a terrible, terrible burden of global pollution to the planet. That should not happen.”

“I got mine, but you can’t have yours?”

“It’s a question of facing realities,” Bradley said.

“Your realities. Not theirs.” (501)

Kenner touches upon a sensitive issue of the power dynamics and the inherent unfairness of imposing emission-reducing measures on developing countries and reveals that activists are simply too arrogant and deluded to take these issues into account. At the same time, what he seems to suggest is an individualistic approach: they face “their realities”, we face ours, but no common realities seem to exist.



Kenner's most prominent quality seems to be his individualism, which he applies to everything he does. He believes only in the truth that he can verify personally, advocates individual action and dismisses any collective effort as hypocritical, misguided, or even malevolent, and collective institutions as intrusive, suspect and inherently contradictory to freedom. He refuses to acknowledge that his individual abilities and knowledge may be limited even to the point where he suggests that the truth can easily be found on the internet. Even though he is a scientist, he is portrayed as confident, assertive, and always right. He is described thus by Sarah, the attractive woman in the group: "She liked being around Kenner. He was so knowledgeable, so skilled. He knew what was going on. He was quick to respond to any situation" (323). Obviously, his image is incompatible with that of a scientist who is cautious and aware of the limits of his knowledge. Therefore, to Kenner, the uncertainty of the predictions of climatology are intolerable; in his view, one either knows everything or knows nothing. From this perspective, it becomes clearer why despite his belief in realist scientific truth he finds it easier to accept that "nobody knows" anything about the climate rather than accept the possibility of being wrong.

In many ways, Kenner is the age-old American hero: he embodies the qualities of "individualism, rugged ingenuity, and resilience" that have been associated with American male heroes as far back as the 17<sup>th</sup> century (MacNeil, 7). He is also confident, strong, attractive to women, intelligent, aggressively individualistic and, most importantly, always right. How does a hero like that fit into a climate-change novel? First of all, believing in climate change necessarily implies believing in the collective effect of humanity on the planet, and it follows logically that a solution must also be collective. Secondly, it requires accepting great changes and uncertainties, something that no one can be prepared for, not even (or perhaps especially not) the inhumanly strong and intelligent hero. He simply cannot adapt. Therefore, the fact that Kenner both believes in objective science and assumes that climate is too complicated to be understood is not so much a contradiction as it is a necessity: if we were to believe climate change, heroes like Kenner would become both impossible and unnecessary. The fight between the truth of the establishment and the individual truth is then not rational and fact-based but cultural and emotion-based.

It would be useful to remember here that *The State of Fear* is a work of fiction rather than science, a popular thriller, and as such aims to provide a strong, perfect protagonist to identify with and is more suitable to uphold rather than question our worldview. It successfully promotes the idea that knowledge can be gained independently and individually, that strong macho heroes remain necessary, and that climate change does not exist. In a word, it is a consolation, and its comforting message is inextricably linked to the form in which it is presented.

Despite its apparent aim to be rational and scientific, *The State of Fear* clearly views climate change in terms of political, cultural, or legal debates, i.e., as something theoretical rather than real and threatening. This is seen best in the previously quoted exchange between Evans and Balder:

“Global warming is the *theory*...”

“—hardly a theory, anymore—”

“No, it is a theory,” Balder said. “Believe me, I wish it were otherwise.” (80).

Here, Balder suggests that it were better if climate change was indeed real. Why? Because that would make it easier for him to win his legal case. It is this, perhaps, that best sums up the approach to climate change in *The State of Fear*: it is simply an argument to be won.

#### *Solar* by Ian McEwan

It is interesting to note that the approach to science and truth in the previous two novels, *Flight Behaviour* and *The State of Fear*, are both very different and yet fundamentally similar. In *Flight Behaviour*, Kingsolver reveals the many layers of knowledge and meaning that form what one calls “the truth”. What we know is inextricably linked to who we are: our background, class, social position, gender, the community we live in. This is why the butterflies invite so many different reactions and interpretations. Identity and community even affect the way the people physically see the butterflies. E.g., if Dellarobia had not grown up in a community where it was common knowledge that “boys don’t make passes at girls wearing glasses” (53), she would have seen the butterflies for what they are immediately; however, she had grown up in just such a community, and in her glasses-less state confused them with fire. Not only do the characters see the butterflies differently, they are in a constant fight over who can articulate their own story and be taken seriously. Needless to say, this also has a huge impact on what they believe should be done about the situation.

*The State of Fear*, on the other hand, presents a much simpler view. The truth exists, and there are those who try to fabricate and cover it up for their own gain; those who are stupid enough to believe them; and the selected few who are not. They are free, brave, and manly enough to find their own truth. Their truth has nothing to do with their community or identity, because they are first and foremost independent and individual. However, what the characters (and, apparently, Crichton) fail to see is that it is simply a different community to belong to, but its values influence understanding of the truth all the same. Although the characters (and the author) assert that they reach conclusions

based on evidence and nothing else, the obvious lack of arguments for the other side suggests otherwise. The truth is on the side of those who assert it more aggressively.

All of which leads to the impression that although the novels are based on actual research and in both cases have characters who are scientists, what comes to the fore is not the scientific facts themselves, but the way these facts are filtered by people. In other words, what is more important in these novels is not the accuracy of the science but the accuracy of the way human nature is depicted, and nowhere is this done better than in In McEwan's *Solar*.

*Solar* focuses on the scientist Michael Beard, a scientist living off his former glory as a Nobel Prize winner, who spends his time tending to his insatiable appetites in food, drink, and women. Beard is presented as a rather repulsive character: gluttonous, materialistic, and only focused on his own personal wellbeing. He is also highly sceptical of art, as we learn from his method of seducing his first wife Maisie Farmer: upon discovering that she was an English student with an interest in John Milton, he spends a week studying his poetry and memorizing passages in order to impress her enough to sleep with him. Although his main takeaway from Milton was being "astounded by its silliness" (107), he uses the information successfully.

Beard is also a believer in a strict dichotomy between arts and science, and sees science as the only reasonable way to understand the world. This is made clear in the scene in the Arctic, where Beard has an argument with a novelist named Meredith about the possibility of applying science to explain ethics, leading Beard to protest: "So come on. Tell me. Let's hear you apply Heisenberg to ethics. Right plus wrong over the square root of two. What the hell does it mean? Nothing!" (47). On the other hand, McEwan himself does not seem to support this worldview. As Seyed Javad Habibi and Sara Soleimani Karbalaie put it: "Writing his novel on a serious environmental predicament from Beard's point of view enables McEwan both to invalidate a cynical scientist's belief in the superiority of science over art in terms of universal issues and to insist on the ability of literature, even in its satirical mood, to make the world conscious about this man-made, environmental catastrophe" (91). McEwan does so by "showing the shallowness and vanity" of his scientist protagonists and presenting "their worldviews as limited, immature and incomplete" (ibid.).

Yet the most interesting and telling passage in which McEwan emphasises the limits of Beard's scientific view of the world does not concern Beard's opinion on Milton or ethics, but on the threat of climate change. As a scientist, he should be well equipped to discuss this issue, however, we learn that Beard's actual views on the matter are rather unexpected:

Beard was not wholly sceptical about climate change. It was one in a list of issues, of looming sorrows, that comprised the background to the news, and he read about it, vaguely

deplored it and expected governments to meet and take action. And of course he knew that a molecule of carbon dioxide absorbed energy in the infrared range, and that humankind was putting these molecules into the atmosphere in significant quantities. But he himself had other things to think about. And he was unimpressed by some of the wild commentary that suggested the world was in ‘peril’, that humankind was drifting towards calamity, when coastal cities would disappear under the waves, crops fail, and hundreds of millions of refugees surge from one country, one continent, to another, driven by drought, floods, famine, tempests, unceasing wars for diminishing resources. There was an Old Testament ring to the forewarnings, an air of plague-of-boils and deluge-of-frogs, that suggested a deep and constant inclination, enacted over the centuries, to believe that one was always living at the end of days, that one’s own demise was urgently bound up with the end of the world, and therefore made more sense, or was just a little less irrelevant. The end of the world was never pitched in the present, where it could be seen for the fantasy it was, but just around the corner, and when it did not happen, a new issue, a new date would soon emerge. The old world purified by incendiary violence, washed clean by the blood of the unsaved, that was how it had been for Christian millennial sects – death to the unbelievers! And for Soviet Communists – death to the kulaks! And for Nazis and their thousand-year fantasy – death to the Jews! And then the truly democratic contemporary equivalent, an all-out nuclear war – death to everyone! When that did not happen, and after the Soviet empire had been devoured by its internal contradictions, and in the absence of any other overwhelming concern beyond boring, intransigent global poverty, the apocalyptic tendency had conjured yet another beast. (17).

Even as a scientist who is perfectly aware of the causes of climate change and its possible consequences, Beard either had “other things to think about” or was “unimpressed” by what he believed to be no more than “wild commentary”. His clear rationalist thinking does not protect him from the comforting but flawed idea that catastrophes simply don’t happen.

It is interesting to compare this thought with Ghosh’s criticism of the modern novel: “the calculus of probability that is deployed within the imaginary world of a novel is not the same as that which obtains outside it; this is why it is commonly said, ‘If this were in a novel, no one would believe it’” (21). According to Ghosh, modern novels began adhering to the uneventful bourgeois lifestyle, pushing anything extraordinary outside of the realm of “serious” literature. He concludes: “Here, then, is the irony of the ‘realist’ novel: the very gestures with which it conjures up reality are actually a concealment of the real” (ibid.). Interestingly, the same logic applies to the rational mind of Michael Beard, who believes his bourgeois life will not be affected by natural catastrophes despite mounting scientific evidence. It is also telling that McEwan does not include a single incident where nature does affect Beard’s life in any way. Perhaps he thought it too improbable, thus revealing the seductiveness of this idea?

However, the plot of the novel is based on another arguably unlikely idea: that the answer to climate change lies in an ingenious technical solution created by bright young scientist Thomas Aldous. Even more unlikely, Aldous does not tell anyone of his idea and gives all his calculations to

Beard, hoping for his approval. Farcically, Aldous ends up having an affair with Beard's wife Patrice and dying an unlikely death when he slips on a carpet and hits his head on the coffee table, leaving Beard in a complicated situation which he turns to his advantage by framing another of his wife's lovers as the culprit and stealing Aldous' ideas.

Through this chain of events, the selfish and self-indulgent Beard becomes a potential saviour of the world, although his only motivation is the money that could be made from Aldous' projects. However, in the end his past catches up with him: his idea is discovered to be plagiarised, and his wife's framed lover leaves prison and gets his revenge by smashing the newly erected solar panels. Knowledge and genius, McEwan seems to suggest, have no chance against the flawed human nature that he masterfully reveals in the satirical character of Michael Beard, an embodiment of all the greed and lack of self-control that modern society came to represent.

However, McEwan ridicules not only the self-indulgent individuals, but also the ineffective collective efforts to find a solution to climate change. This idea is best expressed in the description of Beard's journey to the Arctic to meet artists and climate activists and witness the changes themselves. The story is based on McEwan's own experience, which, speaking about in an interview with his editor Dan Franklin, McEwan summed up thus:

In the evenings, we'd be sitting around, drinking wine with some very nice food cooked for us, and we'd be talking about how to save the world, climate change, what must be done, and we were moaning on about George Bush and the failure of Rio, and the failure of everything else... A general sort of pessimism of intellectuals when gathered talking about the world. And meanwhile, as each day passed, the boot room became more and more chaotic. People started not quite pinching each other's things, but sort of not finding their own and finding something a bit like it, and this chaos gradually extended itself to every corner of this boot room. By the end of the week, it really was in a terrible state. I found myself very amused by the discrepancy between our ambitions for the planet that lay to our south and the fact that these few square feet right behind our backs were in such a state. We couldn't even organise the boot room... Our chances of organising nations, individuals, corporations, and governments were clearly somewhat beyond our reach.

The lack of faith in both individual and collective virtue is expressed by Beard himself in a speech to pension-fund managers: "Virtue is too passive, too narrow. Virtue can motivate individuals, but for groups, societies, a whole civilisation, it's a weak force. Nations are never virtuous... For humanity en masse, greed trumps virtue. So we have to welcome into our solutions the ordinary compulsions of self-interest... [and] the satisfaction of profit" (83). Interestingly, the idea of using the flawed human nature as a tool to combat climate change has been used by other authors, e.g. in another rare humorous climate change story "The Day It All Ended" by Charlie Jane Ander. In it, a

clever businessman floods the market with what people believe to be pretty but essentially useless products, which then turn out to be carbon-trapping devices. In McEwan's story, however, there is no such optimistic ending, but a rather predictable moment in which all of Beard's sins catch up with him. McEwan, however, insists his work was not intended to be moralising: "The thing that would have killed the book for me, I'm sure, is if I'd taken up any sort of moral position, I needed a get-out clause... And the get-out clause is, this is an investigation of human nature, with some of the latitude thrown in by comedy." (qtd. in Brown, 2010).

However, it has been pointed out that "[w]hat is absent from *Solar*, ultimately, are other minds, the sense that people other than Beard are present, equally alive, with something to contribute" (Cowley, 2010). The human nature that is examined here, it seems, is limited to only one particular type of man. It is also interesting to note that the most noticeable real-world climate activists are the exact opposite of Michael Beard: young (often including schoolchildren), determined and having very little actual power, but driven by idealism. Which raises a question – with so many changes in the natural world, why is it hard to accept a possible change in human nature as well?

Concluding the overview of these three novels, it is interesting to note that although they are only seven to 15 years old, they already feel out of date. The changes in the natural world presented here are either subtle or inconsequential but never bizarre, leaving the characters (and the reader) to grapple with their true meaning. Some characters, e.g., in Crichton's novel, seem more inclined to believe in a worldwide conspiracy than any natural changes; others are more ready to accept the inevitable tragedies than the possibility that human nature can change. It also seems that it is that same human nature, rather than changes in the environment, that is brought to the fore in these novels. The truth, as presented here, is never straightforward, but always mediated through one's identity, culture, and deeply held beliefs, the most important of which is that things do not change. The question that naturally follows, then, is whether these beliefs can be shaken by grander and more unexpected natural events. How would the perception of truth and human nature change in a distant future, and what events could provoke such change?

## The Human Point of View in Climate Fiction

In August of 2016, a heatwave in Northern Russia exposed carcasses of deer that had been buried in permafrost, leading to an outbreak of a rare bacterial disease. The disease killed a 12-year-old boy and more than 2,300 reindeer, which were then incinerated. Another 90 people were sent to hospital (Nechepurenko, 2016). This story, reported in the *New York Times*, was concluded with a statement from an official claiming the situation was “unprecedented” – a description that seems increasingly commonplace.

It would be interesting to imagine the reception this story would get if it were fictional. First, just as Ghosh rightly notes about his experience with a tornado (17), it would likely be seen as too improbable to be compelling. It would also seem as a rather clumsy attempt to portray poetic justice, or a bizarre twist on a Christmas tale, with dead children and burning reindeer. In short, it would quite possibly be too strange for fiction. Meanwhile, as a news story, it seems too distant, too disconnected from the everyday and too odd to make headlines (and indeed, it was first printed on page 7). However, the growing frequency with which such stories are reported suggests they cannot be easily ignored.

What does this overlap of fiction and reality mean for how literature in general, and climate fiction in particular should be read? According to cli-fi author Paolo Bacigalupi, “by creating a made-up world, you can show the *real* world more sharply and clearly, and in that process, you have the chance of making people engage not with the future, but with the intense realities of our present – the realities that were previously passing them by” (*Loosed Upon the World*, 14). If this is true, how can fiction help us comprehend realities that are much stranger than imaginary worlds? And how can we comprehend climate fiction that seems too strange to be true? This could mean abandoning the first rule of reading fiction and discarding suspension of disbelief; or, as seems increasingly to be the case, it could mean expanding disbelief into the realm of the real world as well. Or, as a third option, it could mean literature addressing the fact that, as Claire Colebrook puts it, “the prospect of calamity and unprecedented change is so intense that the practical, rational and *imaginative* resources we have for thinking about the future are simply and woefully inadequate” (115, emphasis mine).

Another aspect that ought to be addressed here is the meaning that we ascribe to nature in literature. Is it still possible to read climate fiction from an anthropocentric perspective, i.e., ascribe religious or moral meanings to the natural world, or use it as a metaphor, a stand-in for ideas directly related to human lives? If we refrained from doing this, would that turn the natural world to a simple

literary device, used to enliven the plot? And how can the natural world be read in connection to human characters?

To answer these questions, four short stories from the anthology *Loosed Upon the World* will be discussed here: “Shooting the Apocalypse” and “The Tamarisk Hunter” by Paolo Bacigalupi, “Mutant Stag at Horn Kreek” by Sarah K. Castle, and “A Hundred Hundred Daisies” by Nancy Kress.

### “Shooting the Apocalypse” by Paolo Bacigalupi

The story is set in an unclear but likely not too distant future in Phoenix, Arizona. The south of the USA has been suffering from severe water shortages, leading to mass migration of desperate southerners, especially Texans. The states have introduced a State Sovereignty Act, essentially banning legal crossing of state lines, causing the rise of coyotes aiding desperate migrants in their fight to reach Arizona, or even California, states that continue their normal existence thanks to the Central Arizona Project, or CAP. The CAP is a long artificial canal delivering water to the west side from the Rocky Mountains, a thousand miles away. The inequality created by these circumstances leads to a huge increase in violence with locals growing more and more intolerant towards Texans. Indeed, the main character himself describes them as “assholes” (17), “fools”, and even “ants” (18). They are also often referred to as “Merry Perrys”, after the dangerously optimistic attitude of their governor Rick Perry.

The main character is a photographer named Timo, who sets out to help a young but ambitious journalist Lucy to get a scoop. After they discover a dead Texan, Timo realises that he had been used as an offering to the goddess of death, Santa Muerte. By pretending to be a sweet, inexperienced newcomer, Lucy manages to interview locals and finds an army, ready to battle the arriving Texans for water. The couple prepare to interview the insurgents. However, upon arrival they discover that the CAP has run dry.

In this story, Bacigalupi manages to combine fact and fiction in a way that makes it alarmingly plausible. A significant part of the story is based on fact: the CAP, governor Rick Perry, and the cult of Santa Muerte do exist; the attitudes towards migrants and the language used to describe them has also been the subject of debates for some time. Various sources have described “swarms” of people, countries “infested” by new arrivals, and even referred to migrants as “cockroaches” (Taylor, 2015). Although the attitudes towards migrants are more hostile in the story, the pattern clearly remains the same.



More importantly, Bacigalupi resolves the issue of combining fact and fiction by making his apocalypse terrifyingly simple. The fast-paced journalistic banter of the two main characters and their race to get a scoop pushes the CAP to the background, but does not allow the reader to forget about it completely. In fact, there are moments of reflection in which the characters reveal just how inextricably linked their lives are to CAP. When Lucy asks why Timo believes the Texan was killed as an offering, he answers the question in his mind:

*Because Amparo's boyfriend just lost his job to some loser Longhorn who will work for nothing. Because my water bill just went up again, and my rationing just went down. Because Roosevelt Lake is gone dry, and I have Merry Perrys doing revivals right on the corner of 7<sup>th</sup> and Monte Vista, and they're trying to get my cousin Marco to join them. (12).*

After looming in the background throughout the entire story, the CAP is brought straight to the fore in the end, as the characters find that all the water has disappeared. Without impressive natural disasters or any other bizarre or frightening events, the apocalypse is made terrifyingly present. Yet even faced with this clear disaster, the first thing Timo does is to take out his camera and begin shooting. The drought that brings on so many disasters is made clear and believable, but just as important as the drought is the way it is mediated through photography.

As a photographer, Timo is extremely proud of his ability to see. In fact, we are told repeatedly by Timo himself that “he had the eye”, “he could see what other people didn’t, even when it was right in front of their faces”, and that “[e]very asshole had a camera these days; the difference was that Timo could *see*” (7). Not only that, he could also *show* what he saw to his readers: “Any asshole could snap a pic of some girl blasted to pieces in an electric Mercedes, but Timo knew how to make you cry when you saw her splattered all over the front pages of the blood rags. Some piece of narco ass, and you’d still be bawling your eyes out over her tragic death.” And, as he tells the deceased man his photographing: “When I’m done, people won’t be able to *dream* without seeing you.” (ibid.)

Yet there are many things that Timo cannot see. He cannot see that Lucy is much more cunning than he could have expected; he cannot see that despite that, she is not trying to trick him. More importantly, he cannot see that although he refers to Texans as “fools” and “Merry Perrys” for not taking the risk of drought seriously enough, he himself is just as irresponsible when he risks his life to take a shot of a category 6 hurricane. Moreover, his entire community is in just as much danger as the Texans, with their lives completely dependent on the CAP, which other states could easily cut off, and living in cities that, as Lucy points out, “should not even exist” (16). Finally, upon learning that all the water has gone, he cannot force himself to see the real meaning of that, focusing instead on his photograph and the scoop they have finally found.

This inability to see the mortal threat presents a very postmodern dichotomy between reality and image. Indeed, even with the state on a brink of civil war and natural disasters sweeping the country, as Timo discusses the possibility of writing about these events, Lucy's only reaction is boredom:

But when he started listing possibilities, Lucy shot them down as fast as he brought them up.

Coyotes running Texans across the border into California?

*Sohu* already had a nine-part series running.

Californians buying Texas hookers for nothing, like Phoenix was god-damn Tijuana?

*Google/NY Times* and *Fox* both had big spreads.

Water restrictions from the Roosevelt Dam closure and the drying up of Phoenix's swimming pools?

*Kindle Post* ran that.

The narco murders that kept getting dumped in the empty pools that had become so common that people had started calling them "swimmers"?

*AP. Fox. Xinhua. LA Times. The Talisha Brannon Show.* Plus the reality narco show *Hard Bangin'*.

He kept suggesting new angles, new stories, and all Lucy said, over and over was, "It's been done." (2).

Not only is Lucy tired of these terrifying stories and desperate to find something "new", she is much less interested in the content of the story than she is in the way it is presented. As Timo suggests new stories, she dismisses them by listing "the page hits, the viewerships, and the click-throughs they'd run" (ibid.). The importance of the story is measured by how many times it is viewed, rather than how it affects the lives of a large part of the inhabitants of Phoenix.

In his "100-word Statement of the Millennium", David Foster Wallace writes:

...What's interesting to me is that this isn't all that new. This was the project of the Sophists in Athens, and this is what Socrates and Plato thought was so completely evil. The Sophists had this idea: Forget this idea of what's true or not—what you want to do is rhetoric; you want to be able to persuade the audience and have the audience think you're smart and cool. And Socrates and Plato, basically their whole idea is, "Bullshit. There is such a thing as truth, and it's not all just how to say what you say so that you get a good job or get laid, or whatever it is people think they want." (1999).

However, for Timo and Lucy at least, there does not seem to be "such a thing as truth", and neither the possibility of death nor the apocalypse right in front of them changes that. The characters remain focused on the story and wilfully ignorant of anything else: "He knew the story already – a whole city full of people going about their daily lives, none of them knowing that everything had changed. Timo kept shooting." (24).

Colebrook's idea of inadequate "practical, rational, and imaginative resources" seems to be the main topic of "Shooting the Apocalypse". Interestingly, it could be read as a commentary on the work of a climate fiction writer as well. Just like Timo and Lucy, these writers are looking for a way to present and make more real the changes that should be terrifyingly real even without their efforts, but for some reason are not.

#### "A Hundred Hundred Daisies" by Nancy Kress

Although the stories are not connected, there are interesting similarities between Paolo Bacigalupi's "Shooting the Apocalypse" and Nancy Kress' "A Hundred Hundred Daisies". Both are set in the USA in an unspecified but likely not distant time in the future, both focus on water shortages, both envision states closing off their borders as refugees from waterless states try to flee to those that still have water. However, while Bacigalupi's story is set in Arizona, which receives water through the CAP, Kress' story is set in a farm in the Midwest, which becomes barren as a combination of drought and water being transported through pipeline to "save so many lives in the parched and dying cities" of Tucson, Arizona, and others like it (139). The stories seem almost as if they were written about the same event from two different perspectives, thus strengthening each other's plausibility, like two corroborating witnesses. Kress' story is also obviously inspired by the Dust Bowl.

But while the characters in "Shooting the Apocalypse" are hardened journalists, openly and cynically discussing current events, "A Hundred Hundred Daisies" is narrated by a teenage boy and focuses on him and his little sister struggling to understand and respond to the tragedy of the loss of their farm. The narration thus has an element of childish naiveté that Bacigalupi's story does not. Interestingly, instead of focusing on refugees, unemployment, and looming wars (although the possibility of a war is mentioned in the end), Kress' story gives much more importance to the tragedy of losing the natural environment.

As the story begins, Danny, the narrator, sets out at night to help his father sabotage the pipeline that is transferring water to the Southwest. As he leaves the house, he goes "past the onion field. What used to be the onion field" and takes his bicycle "out from my mom's lilac hedge. No flowers again this year" (129). As a child raised on a farm, Danny still maps his world through natural landmarks, despite the fact they are no longer there. He remarks not only on the absence of functional (the onion field) and aesthetically valuable (the lilac hedge) natural objects, but also on things that had no apparent value for human beings, e.g., "[sweat] instantly evaporates from my skin. There are

no mosquitoes” (130), seemingly drawing no distinction between the two types, and creating no dichotomy between what is “valuable” and what is not.

By comparison, Bacigalupi’s characters sort everything that surrounds them into the categories of “valuable” and “not valuable”, with the natural world falling largely into the latter category. The only animals in the story are prairie dogs, and, although Timo thinks that “dogs were way smarter than Californians” (5), he doesn’t mind shooting them for entertainment while having a drink in a bar. During the game, as a dog is shot, one of the guests remarks: “I think that one was from Texas” (17). So it is not only prairie dogs that fall into the category of “not valuable”; it is certain people as well, not to mention their stories. As Lucy explains: “I’m trying to tell you nobody cares about dead Texans. People string them up all the time. I saw it in New Mexico, too. Merry Perry tents and Texans strung up on fences. Same in Oklahoma. All the roads out of Texas have them. Nobody cares” (11). This insidious logic of value persists until (as implied, although not explicitly stated) Lucy and Timo become its victims as well.

Timo responds to Lucy’s explanation by claiming that she is “wet”, or inexperienced, as she does not understand the real significance of the body they found. A large part of their encounters seems to be focused mainly on avoiding appearing “wet”. For them, as for truly postmodern people, the only unforgivable sin is naiveté, which often takes the form of caring about something other besides their own wellbeing. Notably, Kress’ characters are allowed a certain degree of naiveté, such as being upset by the loss of the natural world that used to be part of their farm, but only because they are children. It is not clear whether the adults share that sentiment or whether they are only upset by the loss of their livelihood. Crucially, disregarding the categories of value remains the prerogative of children, with adults either unable or simply lacking the possibility to do the same.

Another interesting aspect of the two stories is the role photography plays in mediating the natural world. In both stories, photography is a tool that mediates reality, and often becomes more important than reality itself. Timo uses photography to create stories, treating the world as an endless supply of images that cannot affect his existence in any way: he goes out into a category 6 hurricane just to get a good shot; upon learning that CAP has no more water, the first thing he does is take photographs. For him, the distinction between images and reality is not quite clear.

Photography plays a big role for Danny and his sister Ruthie as well. Ruthie, we learn, is too young to have seen the farm as it used to be, so she saves pictures of the farm that their mother had taken away because she could not bear to look at them. Ruthie asks Danny to identify the images: “*That’s Great-Uncle Jim in front of the barn we sold to the Allen people; that’s Grandpa driving the combine.* She doesn’t remember any of it, but I do.” (134). When looking at one of these pictures, Ruthie notices a field of daisies and asks what they are, leading Danny to realise she is probably too

young to know that: “When was the last time I saw a daisy? Had Ruthie ever seen one? I say, ‘Fuck, fuck, fuck.’” (135). For Ruthie, a nature mediated through pictures is the only nature she has ever known; for her, the connection between signifier and signified has truly been severed. This is also obvious in the way she cannot imagine the cities to which their water is being taken: “Ruthie says: ‘The pipeline people are fixing it. It’s supposed to carry water to ‘The Southwest’’. She says the words carefully, like she might say ‘Narnia’ or ‘Middle-Earth’.” (136). Reality and fantasy become all but indistinguishable.

Interestingly, she begins drawing daisies obsessively, surrounding herself with images of a world she has never seen, signifiers with no signifieds, presenting an impossible dream. In the end, her brother uses her drawings to present a temporary consolation – he takes the paper daisies out and places them in the field where real daisies used to grow:

The flowers are scattered all across the bare field, each now on its own little square of paper: yellow centres, white petals outlined in green, green leaves until the green crayon was all used up and she had to switch to blue.

“Oh, Danny!” she cries again. “Oh, look! A hundred hundred daisies!” (142).

Notably, shortage is inseparable from this story – not only is there not enough water to grow real daisies, there is not even enough green crayon to colour the paper ones.

Guy Debord noted that “Everything that was directly lived has moved away into a representation” (30); in these stories, however, the phrases takes on a much more literal meaning than he perhaps intended. Characters in both stories do not experience their surroundings directly: Timo is only interested in capturing images and turning them into profit; Danny maps his life with mental images of landmarks that no longer exist; and Ruthie escapes into images of a world that, to her, is pure fantasy. Images soothe, shelter them from the real world and at the same time conceal it: for Timo, they provide a sense of control; for Danny, a soothing memory; for Ruthie, a hopeful dream, pushing all of them further from comprehending reality. The question remains, however, as to whether literature, itself made of mental images, acts as an antidote to this mindset or simply perpetuates it.

#### “The Mutant Stag at Horn Creek” by Sarah K. Castle

The first thing that is notable about this story is its title. “Mutant” is not a word that is normally associated with what Amitav Ghosh would call “serious” literature; it is clearly more reminiscent of

superheroes who gain powers after coming into contact with radioactive waste or monsters in science fiction works. The story does indeed feature radioactivity: Sue, a park ranger, works in the Grand Canyon, which, due to heavy rainfall and floods caused by climate change, is filling up with water. As the water fills abandoned 19<sup>th</sup> century and more modern mines, the water that comes out is contaminated with sulphate, lead, and even uranium. Before long, Sue starts noticing animals affected by radiation, most notably a stag with a strange and distorted set of antlers and a set of fangs and a desert tortoise that had grown protective spikes on its shell.

It is easy to read the story as a simple metaphor of nature fighting back against humanity, and radioactivity also seems like a rather clumsy literary device. A 2014 genetic study on animals in Chernobyl and Fukushima by Timothy A. Mousseau and Anders P. Møller states that “few genetic studies...have been conducted in Chernobyl”, while in Fukushima “[i]nsufficient information exists for groups other than insects and birds to assess effects on life history at this time” (704). Radioactivity, with its frightening, unpredictable and little-studied effects thus becomes a perfect excuse for any changes a writer might want to make. Although, according to the same study, “most if not all expressed [genetic] variation [caused by radiation] will be deleterious” (ibid.), such as tumours, cancers, and declining populations due to decreased fertility, writers have long been using radiation to create both monsters and popular superheroes from Hulk to Spiderman to the more obvious Radioactive Man.

However, the story becomes more complex as Sue invites her niece Katy to go on an expedition to Horn Creek with her, partly because she wants to persuade her niece to become a park ranger herself, and partly because she wants to explore the changes caused by radiation in local wildlife and is advised not to venture out alone. She has not seen Katy for years and is shocked to discover that she arrives shirtless, wearing data specs that she uses so often that Sue is never really sure if her niece is looking at her or a computer screen. Katy has also shaved her head and covered her body in photosynthesizing nanotechnology tattoos, which look like soft green moss that grows on her body, generating electricity to power her spectacles. Although her niece has not been subjected to radiation, she nonetheless seems like a mutant herself. Even more frighteningly, she has undergone all of these changes willingly, in order to create what she calls KC, or killer content – eye-attracting social media posts that she hopes will bring her fame, riches and the attention that she desperately craves.

As the story progresses, the line between what could be called “natural” and “man-made” becomes ever more blurred. The canyon is filled with mutant wildlife from the uranium mined during World War II; Katy is covered in power-generating moss that grows straight on her skin; moreover, we learn that the deer have turned carnivorous and now feed on the tortoises that were rescued from

extinction and brought to the canyon by Sue. Arguably the most bizarre incident, however, is when the two women meet a group of carrion-eating condors:

They looked like a group of bald, feathered kids. That's how big they were. The two bigger ones turned their black, beady eyes our direction. ...

"Bob?" The biggest condor said. The name gurgled up from deep in its throat.

I froze, shocked to hear a word from its big, hooked beak. My mind spun on it. Bob Patchett was the only man left on the California condor captive breeding program. He'd been alone up there at Vermillion Cliffs for decades, hand-feeding every baby bird until it was old enough to hunt for itself. I'd heard rumors he even chased the parents off sometimes so the little critters would still need him....

I thought fast and remembered the one thing that made Bob Patchett really mad. He'd been married once. The woman had been the last to leave the program up there. I searched for her name.

"Diane!" I shouted. "Diane!" I launched a curse-laden tirade against this woman I'd never met. (470–471).

Everything in the Canyon, it seems, is in some way affected by humans. Sue is perfectly aware of this, which is highlighted by her habit of beginning sentences with "God only knows why..." and completing them with "No, I take that back. God had nothing to do with it" (455, 457). Regular rules do not apply here, as we are told when the women find a smashed shell of a tortoise and speculate what animal could have done that:

"Do the condors smash them?" Katy asked. "Maybe they drop them from up high."

"I doubt it. Condors don't think to kill."

"Condors don't talk, either."

I didn't have any answer for that. (477).

The question of rules comes to the fore here: who exactly decides what condors, and, by extension, all of the natural world (although the very concept is questionable here) do and do not do? The definition of normality is problematic at the best of times, and in a world quickly and dramatically transformed by climate change, becomes close to meaningless. Returning to the title, the word "mutant" itself, despite its obvious negative connotations (the OED includes "oddity", "monster", and "freak" among its synonyms), refers to an entity that has adapted to its surroundings. In this sense, the speaking condors, spike-covered tortoises and carnivorous deer are mutants, but so is Katy. Sue's uneasiness around both her and the animals stems from the fact that they deviate from her mental image of normality. Yet images are deceitful, as Sue herself knows from her experience of trying to ward off tourists from picturesque but deadly acid lakes: "After a day hiking across the Tonto Plateau, baking like a cookie on a shale oven sheet, a hiker would see a turquoise pool rimmed with brilliant

orange in a shady canyon bottom and you couldn't keep 'em out of it. I know. I tried." (453). Everything in this park is not what it seems.

By choosing the Grand Canyon as the setting for her story, Castle focuses on the epitome of American wilderness. However, as Alison Byerly points out, this wilderness is in fact a myth:

The Wilderness Act's own definition of wilderness reveals the paradox involved. The visitor to a wilderness area should find a place that has not been visited. A wilderness is "an area where the earth and its community of life are untrammelled by man . . . which generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; [which] has outstanding opportunities for solitude" (Allin 278). It is difficult to see how such an area could remain untrammelled while being used by even a small percentage of the American people, or how it could provide opportunities for solitude to numerous visitors. This description applies only to specified "wilderness areas", but large sections of some parks are so designated: in Yellowstone, for example, 61 percent of the land is managed as "wilderness" (Mealey 208). Furthermore, it does in many ways represent a popular mandate for what a national park ought to be. Fortunately, an escape route is encoded in its language: it designates an area that "appears" to be affected primarily by nature, one in which man's imprint is present but "substantially unnoticeable". It describes an image, not a reality. (57).

In short, a national park is a place of wilderness that is an image made by careful management so that it does not seem to be managed at all. Much like Katy's KC, the park is an image carefully constructed to please its viewers, and it is Sue's job as a park ranger to maintain that image. However, as the image begins to deviate from the one Sue (and the visitors of the park) have in mind, the fact that it was an image from the very beginning begins to emerge, leading to the question of how this image should be interpreted. Should the mutant stag be seen as a monster, or a kind of superhero of nature? Should the changes in wildlife be seen as terrifying, or hopeful? By posing this question, Castle addresses one of the deepest fears from climate change, and that is change itself, and, more importantly, change of nature which until now seemed to be unchangeable (isn't permanence the meaning encoded in phrases such as "human nature"?)

Notably, the human beings in the story are both the agents and patients of this change. As Sue muses on their discoveries, she realizes: "It was her world, our world, a world largely changed by us, and I couldn't deny my hand in it." (485). Castle touches on the fundamental problem for human beings in terms of climate change, which is being both extremely powerful (as Sue notes, "playing God is a tough role, but in this case, somebody had to do it" (477)), and yet individually almost powerless, both victims and perpetrators. As Sue stops to examine the skull of a mutant stag she had a hand in killing, she "blessed it with a prayer of about good intentions and unintended consequences" (485), despite the fact that, as she herself has said before, "God had nothing to do with it".



## “The Tamarisk Hunter” by Paolo Bacigalupi

Similarly to “Shooting the Apocalypse”, “The Tamarisk Hunter” is set in an unspecified time in the future, when water shortages have transformed the south-western part of the USA beyond recognition. This time the story is set in Colorado, which has been turned into a desert as all the water from the Colorado River is being taken to the richest state, California. This time, however, the story is focused on a place that has turned into a ghost town long ago, bringing to the fore those who are left behind, and highlighting the cruel economics of sharing scarce resources.

As water becomes ever more precious and expensive, it is decided that it should not be wasted on animals and plants, especially not the tamarisk, a wispy, pastel-coloured plant that can consume 73,000 gallons of water a year. Lolo, a tamarisk hunter, is paid to find the plant, document its position, and cut it down. For this, he is given an allowance of water and a reward of 2,88 dollars a day. However, in a truly modern fashion, Lolo finds a way to capitalize on this arrangement without actually performing any service: for each plant he cuts down, he plants several others to provide a source of income for him in the future, thus creating a sort of parody of agriculture in the time of post-apocalyptic capitalism.

The cruel but undeniable logic of capitalism leaves the characters in a position that could be described as unnatural: having the resources required for their survival but not being able to use them. As Lolo put it: “The problem wasn’t lack of water or an excess of heat, not really. The problem was that 4.4 million acre-feet of water were supposed to go down to California. There was water; they just couldn’t touch it. They were supposed to stand there like dumb monkeys and watch it flow on by.” (513). The comparison with monkeys, however, is not the most apt: it is clear that of all the animals, only human kind is capable of creating a system that stops them from using vital resources in the name of capital.

Another aspect that could be described as unnatural is that the simple need to consume water is suddenly regarded as a crime for both plants and people. This is most striking in the language that is used to describe them. The tamarisks are described as “offending tamarisks” (512), purposeful criminals committing the crime of simply existing. People, on the other hand, seem to take on more passive qualities: “everyone else has been blown off the land as surely as dandelion seeds, set free to fly south or east, or, most of all, north” (512). Lolo, however, stuck to his land: “where other people have dried out and blown away, he has remained: a tamarisk hunter, a water tick, a stubborn bit of weed.” (511). His insistence on staying is not portrayed as heroic or strong; instead, he is described in much more telling comparisons to a parasite and a weed. The former is a type of being whose

nature and manner of surviving is seen as morally wrong, while the latter is a plant that simply grows in the wrong place – both of these, of course, based on the perspective of people. But in this case, no more distinction between plants and human beings seems to exist: nature-like qualities are ascribed to people while plants are given human-like agency. What unites them is their existence in the wrong place and in the wrong manner.

In these circumstances, both people and plants have two choices: either passively dry out and be blown away by the wind, or actively persist in the crime of being alive and needing water. Yet even in dire conditions that have left entire towns abandoned, there are still environmental activists who understand this implication and fight a battle that is largely philosophical. As the situation deteriorates and it becomes clear that Lolo might not be able to keep up his practice, he suddenly begins to understand the activists:

“Those enviros, they don’t make any sense at all. Not enough water for people, and they want to give the river to a bunch of fish and birds.”

Lolo nods emphatically and grins wider. “Yeah. Stupid.” But suddenly, he views the eco-crazies with something approaching brotherly affection. The Californians are after him, too. (521).

In this story, Bacigalupi achieves a very important goal in terms of ecocriticism, namely creating a narrative that persuasively questions anthropocentrism. It does so not by elevating and praising the natural world, but by downgrading people to the status of plants. The injustice and inconsistency implied by words such as “weed” or “parasite” are not immediately clear until they are used to describe a human being, in this case Lolo, whose existence becomes a criminal action. Although the judges who deem his life unworthy are simply referred to as “Californians”, the clearest culprit is capitalism itself and the characters’ inability to resist it. As Lolo’s companion, tamarisk hunter Travis put it: “Sometimes, I wonder if we shouldn’t have fought them more...Even if it’s just for pride” (516). Bacigalupi’s story expresses Bruno Latour’s idea that while nature used to be seen as a permanent and unchangeable force, its place is now taken by collective human activities (4), in this case most notably the forces of the market. Nature seems changeable and easy to manipulate, while the rules of capitalism seem to be set in stone.

But even if we were to “fight them”, as Travis urges, who would “they” be? As Latour puts it, “How could it be ‘us’ who did ‘all this’ since there is no political, no moral, no thinking, no feeling body able to say ‘we’ – and no one to proudly say ‘the buck stops here’?” (ibid.) Notably, in the end Lolo does decide to fight by preparing to shoot two guards; however, upon meeting them he realises one of them is his childhood friend. Lolo cannot bring himself to shoot him; and, certainly, it is not his friend’s fault: “Hale’s eyes plead for understanding. ‘Come on, Lolo. I’m not like you. I got a

family to look after. If I do another year of duty, they let Shannon and the kids base out of California.” (522). Lolo does not fight.

Despite the strangeness of real climate change-related events, the stories presented here are based on a very simple concept: water that either disappears or fills places it should not, with unpredictable consequences, as in Castle’s “The Mutant Stag”. Yet these very simple events undo the very fabric of society, bringing about immensely complex and interconnected consequences. People, plants, and animals all adapt (or mutate) as much as they can, with the differences between them quickly disappearing as scarce resources create a system where only the fittest of the fit can survive.

Yet what connects most of the stories discussed here, however, is their characters’ inability to grasp the reality of these changes, instead relying on images that are used to shelter, soothe, and provide control, as well as increase the wealth and status of those who create them. With no hope of changing the pervasive capitalist system, the people in these stories are only enjoying the spectacle of a burning world. If the question is, as Caren Irr puts it, paraphrasing from Frederick Jameson, “whether it is easier to imagine the end of the world through climate induced flooding than it is to ponder life after capitalism” (4), the answer provided here is that anything is easier to imagine than life after capitalism. Certainly, this provides ample support for what Amitav Ghosh calls “a crisis of culture, and thus of the imagination” (13). The question that remains is whether literature is capable of solving this crisis, or simply provides more images, pushing us away from the possibility of drawing a line between what is real and what is not.

## Climate Change on the Fringe of “Serious” Literature

It has been argued that modern novels are ill-suited to narrate climate change for two reasons. One is that climate change is caused by collective rather than individual actions; the other is that the changes in climate manifest themselves through ages rather than short periods of time. The novel, on the other hand, is set in a limited space and time, and focuses on the individual rather than the collective, as Amitav Ghosh argues in *The Great Derangement*:

Novels, on the other hand, conjure up worlds that become real precisely because of their finitude and distinctiveness. Within the mansion of serious fiction, no one will speak of how the continents were created; nor will they refer to the passage of thousands of years: connections and events on this scale appear not just unlikely but also absurd within the delimited horizon of a novel – when they intrude, the temptation to lapse into satire, as in Ian McEwan’s *Solar*, becomes almost irresistible (42).

For this reason, he argues, many modern novels may fail to express the threat of climate change. However, he does agree that this flaw is not inherent in the novel itself: “I do not think that this turn in contemporary fiction has anything to do with the novel as a form: it is a matter of record that historically many novelists from Tolstoy and Dickens to Steinbeck and Chinua Achebe have written very effectively about ‘men in the aggregate’.” (53). In short, novelists are capable of writing about ‘men in the aggregate’, but perhaps discouraged to do so in fear of seeming “backward” in a “dominant culture in which the idea of the collective has been exiled from politics, economics and literature alike.” (54).

On the other hand, it could also be argued that climate change is no longer a phenomenon that can only be seen in the “passage of thousands of years”. As Michael Oppenheimer, a Princeton Professor of Geosciences and International Affairs, put it in an interview: “Earth is already starting to change. The climate is now significantly different than it was 100 years ago, even 30 years ago. ... Springtime is coming significantly earlier. So the trend of global warming ... is starting to have consequences that are perhaps not yet terribly painful, but are certainly becoming noticeable to the average person.” (Schultz, 2019).

While it is true that changes in climate are becoming much more pronounced, it is arguable whether they are really visible to the average person. A 2013 study on the perception of extreme climate events found rather unexpected results:

When asked about the summer of 2010, those who believed that global warming is not happening were significantly less likely to report that they had experienced a warmer-than-normal summer, even when controlling for demographics and local climate conditions. These results suggest that the subjective experience of local climate change is dependent not only on external climate conditions, but also on individual beliefs, with perceptions apparently biased by prior beliefs about global warming. (Howe, Leiserowitz).

Another question that could be posed here is if the consequences of climate change are indeed becoming visible to the average person, what form do they take? On the one hand, organisations such as the Energy and Climate Intelligence Unit in the UK claim that their “2018 report shows that over the last year, scientists have published at least 43 research papers looking at links between climate change and extreme weather events, of which 32 found that climate change made the events more likely or more intense” (eciu.net). On the other hand, changes smaller than sweeping natural disasters may be visible and have an impact as well. As writer Alexandria Harris put it in her book *Weatherland: Writers and Artists under English Skies*: “small alterations in familiar places can disturb us more than dystopian visions” (386).

In short, writers of climate-change fiction must bring into fiction changes that have been forming for thousands of years through the collective impact of humanity in its entirety, which are becoming visible in the shape of both great disasters and small changes, for a population that may be disinclined to believe in them, and do so in a literary form that favours the small, individual-centred narrative which is not particularly suitable for this daunting task.

Two questions arise here. The first is what genre is more suitable to bring climate change into fiction. Many authors seem to favour a setting in a distant future, a dystopian world created after a global natural disaster (Margaret Atwood’s *MaddAddam* trilogy is an excellent example). Others, however, chose a different path and focus on smaller changes in more contemporary times (e.g., Barbara Kingsolver’s *Flight Behaviour*). And others chose what could be called less “serious”, genre literature, such as science fiction (such as Paolo Bacigalupi’s *Windup Girl*) or teenage fiction (such as Stacy Lloyd’s *Carbon Diaries 2015*). It could be asked which of these choices is better.

The second question is what exactly makes a novel “better” in this case. A climate-change novel can be seen as a piece of literature whose only purpose is to raise awareness, educate, and warn about the possible effects of climate change. However, as novel, it must retain its purpose to captivate, spellbind, and narrate experience, or, as Jerome Bruner put it, to provide a “comprehension of plight that, by being made interpretable, becomes bearable” (16). Every climate-change fiction writer must find a balance between these two inherent purposes, neither of which, it seems, can be discarded.

Certainly, there may be many ways. In this section, three novels will be examined that attempt to address the aforementioned difficulties, all of which present a different approach towards literature.

The first, *Carbon Diaries 2015* by Stacy Lloyd, was chosen for several reasons. The first thing to note is that it is a teenager novel and adheres to most conventions of the genre, making it rather predictable and seemingly outside of the realm of what could be called “serious” literature. Nonetheless, it will be argued here that this does not make it any less compelling as a climate-change fiction novel, and perhaps even more so: because its form and conventions are so familiar and predictable, introducing climate change into the plot embodies Harris’ idea of “small alterations in familiar places” that have a lot of power to disturb.

Another reason why this book was chosen is its unusual focus not on a great and all-changing natural disaster, but on a series of small, mundane changes, which taken in isolation might seem meaningless, all emphasised by the form of a diary. This section will examine the reasons this might be done and discuss whether this can be an artistically compelling way of describing climate change.

Finally, as this is a teenage novel, the issue of generational conflict will also be explored here. This includes both the fictional and the real-life aspect of the relationship between teenagers and their adults. Bearing in mind that climate change was very much caused by the previous generations and that the adults in charge seem unable or unwilling to take any action against it, it is interesting to examine how the fictional teenager-adult relationship is affected by this. Another thing to consider is that it is a novel written by an adult for younger readers and how this affects its purposes: is its goal to instruct, entertain, or can it be simply a narration of experience?

The second novel that will be examined here is *The Windup Girl* by Paolo Bacigalupi. Set in the distant future in Thailand, which is one of the few countries that have not been swallowed by the sea and still have food supplies, the novel is clearly a work of science fiction, which is emphasised by the fact it received many science fiction awards, such as the Hugo and Nebula awards. It has been chosen for two reasons. One is that although it clearly belongs to the science fiction category, it does not focus on distant galaxies and space travel, but instead examines the possible future of our planet. The second is that despite being set in an unrecognisable world, it is focused more on very familiar human woes and inadequacies, examining not only individuals, but whole systems of power and the way they affect the characters. The question is posed if a work of science fiction can be considered as a compelling work of art that at its heart examines the human condition.

Notably, neither of these two novels would conventionally be considered a “serious” novel. This choice is made deliberately, to examine works that are more distant from the definition of a serious modern novel and explore the ways in which climate change is described there, with the hope of finding different but still artistically compelling ways of approaching this type of literature.

The third part examines Margaret Atwood’s trilogy *MaddAddam*, composed of three novels: *Oryx and Crake*, *After the Flood*, and *MaddAddam*. Many papers have been written examining

various aspects of these novels; however, only a brief discussion will be made here. Opinions differ whether the trilogy could be considered science fiction, with many believing that it could despite objections by the author herself. It will be argued here that it stands in between literary and science fiction, highlighting the ways these two types of fiction can influence each other and create a potent combination in which climate change can be discussed. It will also be argued that these novels examine the essence of being human in a world altered by climate change, and do so in different ways, combining science, myth, and satire, to reveal the various aspects of how we understand this world and our place in it.

*Carbon Diaries 2015* by Stacy Lloyd

Before discussing a teenage novel on climate change, it is useful to look at teenage novels in general. There are many debates about it as a category – as Natalie Babbitt wrote in 1972, “teenagers do not need a fiction of their own: they are quite ready to move into the world of adult fiction” (36). Of course, the view on whether teenage novels should exist has certainly changed since then. As Johanna Risku explained: “teenagers became an attractive target market segment for book publishing in the middle of the twentieth century because of their increasing economic resources”, a tendency that certainly continues today, leading to a conclusion that “it seems as though YA [young adult fiction] is only now reaching its golden age” (14). However, despite its financial success, it is still viewed with some suspicion. As Risku explains, this is firstly because teenage fiction is difficult to define as its definition depends on the definition of “teenager”, which is always subjective. She settles on a definition that it is “fiction published with the *intention* of being read by and marketed for adolescent readers” (emphasis original) (13). This is, of course, problematic, because the category is certainly defined by people outside of it, based on assumptions of what they are and what they want from fiction. According to Risku, another problem that stems from this is teenage fiction being regarded as “genre fiction”, which, as Evnine explains, is “usually pejorative; it suggests the work in question is formulaic, trite, intended for undiscerning readers, and not the product of real authorial craft” (14). In short, teenage fiction is in danger of being viewed as an unclear category created with the intention of capitalising on a new segment of the market, and based on simple formulaic narratives.

Interestingly, climate fiction is also subject to some of these criticisms, leaving *Carbon Diaries 2015* in a difficult situation of being viewed as not “serious” from two different angles. From

certain perspectives, it can certainly seem formulaic. As Barbara Martinec explained in her 1971 essay:

In all junior novels... the protagonist is always confronted by a personal problem. At the beginning of the development of the junior novel in the 1940s, this was usually a purely personal problem: how to overcome shyness or jealousy, how to get along with a brother or sister or the opposite sex. During the 1950s a swing began towards more topical themes; and today the problem is more likely than not to involve a social or moral conflict: divorce, race prejudice, alcoholism, or drug addiction. (341).

*Carbon Diaries*, despite being written decades later, still includes many of these elements: the protagonist Laura Brown struggles to overcome shyness and speak to the boy next door; tries to get along with her older sister; wants to become popular with her band; deals with the possible divorce of her parents and her father's alcoholism; and tries to cope with all the social and moral conflicts brought on by strict carbon rationing imposed by the government to fight climate change.

According to Martinec, formula in the plot of teenage novels has invariably been seen as negative, with critics paying little attention to it apart from condemning it. She writes: "The assumption is that any work written to a formula is by nature abominable; the plot of such a work is not worth discussing. Only a junior novel that departs from the formula in some significant way has any claim to merit." (340).

However, she argues that the popularity of such formulaic works and their endurance (comparable to that of a Western or a detective story) proves that the formula is an aesthetic element that is worth discussing. The formula of a typical teenage novel, she claims, suggests several ideas: 1) that immaturity is the basic problem of teenagers and leads to isolation; 2) that all problems will be solved successfully; 3) that adults are ineffectual and communication is only possible with peers; 4) that solutions are discovered by chance; 5) that one must mature by conforming without losing one's individual identity. These ideas, she argues, correspond to the developmental tasks of this particular age group proposed by Robert J. Havighurst in his 1953 book *Human Development and Education*. According to Martinec, these are "learning new relationships to peers, achieving independence from parents, and acquiring self-confidence in a system of values of one's own". For this reason, she concludes, formulaic teenage novels continue to be popular (344).

Although *Carbon Diaries 2015* does conform to this formula in many ways, there are few significant differences. The first of these is that almost all of the problems, both personal and societal (or even moral) are caused directly by climate change. The book begins with an announcement that the British government is going to attempt to fight climate change by introducing a system in which



every citizen is given a card with a certain amount of “carbon credit” that they are allowed to spend each month. After the credit has run out, the person can no longer engage in any activities that result in burning fossil fuels, which means such essentials as taking a bus or shower, eating hot food or having heating at home may become unattainable. To the protagonist Laura Brown, this brings a number of personal problems: she cannot play in her band, as using electric guitars takes up a good deal of credit; her relationship with her older sister deteriorates as her sister fails to conform to the new system, bringing a lot of problems for the family; her love interest has the skills of a mechanic, which makes him extremely popular in a world where faulty gadgets can rarely be replaced by new ones, leaving Laura struggling to get his attention against many rivals. The carbon rationing system also brings societal problems: Laura’s father loses his job in the tourism sector as tourism becomes out of reach for most of society; her parents fight bitterly because of their inability to find their place in this changed world, leading them to the brink of divorce; her best friend, an adult gay barber, also struggles as his profession becomes obsolete; her neighbours get involved in a black market, dragging in her sister as well; and, as people protest against rationing, violent riots break out, leaving Laura feeling unsafe to enjoy things like going out to a concert. In addition, the inability to make the carbon ration last for the entire month is seen both as shameful as poverty and indicative of a certain moral failure.

Margaret Atwood defines climate fiction as “books in which an altered climate is part of the plot” (2013). In *Carbon Diaries 2015*, however, an altered climate is not just part of the plot; it is the plot. All of the protagonist’s problems can be traced back to an altered climate and every turn of the plot is caused in some way by climate change, making it a perfect blend of climate fiction and teenage fiction.

Another way in which *Carbon Diaries 2015* differs from the typical formula of teenage fiction is the way Martinec’s idea of immaturity is expressed. Immaturity (which Martinec claims is the most important problem for teenagers) takes the form of the inability to last the month without going over the limit of carbon allowance – notably, at the very end of the book the narrator finally manages to finish the month without exceeding her limit, suggesting she has in some way become more mature. This means, however, that immaturity is no longer only a problem for teenagers; others have to learn to be mature as well, including Laura’s older sister Kim, her parents, and society in general. In teenage fiction in general, Martinec claims that “[p]arents and teachers are usually depicted as wise and benevolent but rather remote. Though they have the answers that the teenager is seeking, parents are unable to communicate their knowledge” (343). Clearly, this is not the case in *Carbon Diaries*, where parents are just as immature as teenagers, if not more. In the altered world, everyone is a teenager, struggling to cope with immense changes and find their place in society. This indicates a shift in the

typical formula of teenage fiction, which is also reflective of changes in real-world society, namely the fact that a lot of climate change protests are now being led by teenagers (most notably Greta Thunberg).

Another typical idea in teenage fiction that Martinec mentions is that all problems will be solved successfully. Again, *Carbon Diaries* does not seem to conform to this formula entirely. Although all the main characters (including the pig Larkin) miraculously survive a terrible flood there is no sense that, as Martinec put it, “all problems can be solved and will be solved successfully” (344). On the contrary, the protagonist finished her diary with a less-than-optimistic note: “So, it’s the last day. I wish I had some big words to finish, but I’ve got nothing. I’ve made it thru – but my family, the *angels*, college, the future...I don’t know. Like Adi says, it’s just one day at a time from now on. That’s the only thing I got left.” (379). Climate change has no easy solutions, no one can afford to have long-term hope, and not even youthful idealism can ignore that.

*Carbon Diaries 2015* differs from a typical work of teenage fiction in several ways: the main source of both personal and societal problems of the protagonist is climate change; immaturity, understood as the inability to adapt to a new way of life under carbon rationing, is a trait of both adults and teenagers, distorting their regular relationship; and the hopeful belief that any problem can be solved is no longer there. On the other hand, the novel also differs from a “typical” climate-change novel as well. Admittedly, climate-change fiction as a category is too new and often includes too many different types of literature for it to be possible to define what a “typical” climate-change fiction work is like. However, there are some traits that seem to be common in many of these works, many of which have been mentioned here as well. For example, Adam Trexler claims that: “In the majority of climate change novels, a local disaster makes global warming undeniable and immediate, rupturing quotidian life and suppressing questions of belief” (227). In *Carbon Diaries*, the existence of climate change is also taken as a given; the only question up for debate is how it should be fought. Strangely, although it is clear that the harsh carbon rationing is only imposed in Britain (the protagonist’s cousin Amy, who lives in the USA, does not have to comply with rationing), little mention is made about the unfairness of the situation or about protests against it. The characters are focused more on how to adapt, even if adaptation means joining the black market, as Laura’s sister Kim does.

An aspect that is unusual for *Carbon Diaries* as a climate-change novel is its lack of great disasters. Although the novel ends with a big flood, the majority of it focuses on small, unpleasant, but not dangerous changes such as the weather being too cold or too hot and droughts following floods. More importantly, quotidian life is not “ruptured” because of this, but simply changed, with people attempting to adapt their needs and lifestyles to extreme rationing. One good example of this

is Laura's friend, a gay barber called Kieran, setting up a dating group to help people cope with the changed rituals of dating. As a member of the group explains:

Y'see, I work in film, so there's loads of freebie parties happening, but the problem is my old lines don't work anymore. Before, I was always travelling. I could take a girl away for the weekend, spin her around in the company Merc, whatever. Now it's like I've got nothing to offer. I'm bankrupt. All I can say is *Hi, I'm Miles...* Do you know how lame that sounds? I'm really starting to lose it – not gone out for a month. I've even... been reading nineteenth-century novels, looking for old-fashioned pick-up lines, pre-electricity! How tragic is that? (200–201).

This episode, like many in the book, is clearly made to be humorous, but is nonetheless illustrative of the unexpected ways that climate change can affect the everyday life of everyone. Notably, the protagonist struggles with romance for a similar reason – the boy she is in love with is good at mechanics and is able to fix many gadgets, which makes him extremely popular when gadgets cannot simply be replaced anymore, leaving her struggling to compete with the many new rivals.

Also unlike other climate change novels, *Carbon Diaries* does not include a single character who is a scientist or climate or biology specialist of any kind. Without this type of figure, the novel lacks scientific explanations or predictions, but focuses instead on the daily lives of simple people. This means that the novel, also rather unusually, focuses on the emotional side of climate change. Although a 2018 Yale study has found that climate change makes 70% of Americans feel “worried”, 29% “very worried”, and 51% “helpless” (3), leading to what is called “eco-anxiety”, described as “a recent psychological disorder afflicting an increasing number of individuals who worry about the environmental crisis” (Leiserowitz et al.), this feeling is rarely described in climate-change fiction. *Carbon Diaries*, however, does depict it and the different ways it affects the characters. Laura's father, for example, either resorts to drink or makes elaborate plans to create a sustainable living; her mother attends various emotional support and “empowerment” groups; her sister either shuts herself up in her room or rebels by secretly flying to distant resorts. Laura, on the other hand, succumbs to despair as her boyfriend leaves her because he believes relationships have become useless in the face of climate change: “But anyway, with everything that's going on it don't feel right to be kissing and holding hands and all that shit. What's the point...? I mean, what future is there for any of us?” (286). Although she is upset and hurt, she believes his words are more than just a silly excuse: “5 a.m. Can't sleep, been crying all night. I have Ravi Datta so much. And you know why? Cos he's got no hope now I'm scared I haven't got any either. That I'm just acting out a part and I know there's no future for any of us.” (287).

Discussing the future is also something that is often absent in other climate-change novels or is only covered in vague predictions or worries. In *Carbon Diaries*, however, the question of the future is presented as much more important and present as teenagers must make choices concerning their future without knowing what to expect:

“Adi, what are you going to do after college?”

“Dunno. I was gonna study Media at university, but my dad there’s no jobs in that now. He wants me to do Medicine. Like 1) that’s ever going to happen with A- levels in English, History, Art, and Media – and 2) I don’t want to be a doctor, I hate sick people.”

We paused in front of a row of sneakers. “But rationing’s not going to be this bad *for ever*,” I began. “It’s just super intense now, maybe for a decade...but then green engines and fuels’ll sort us out.”

Adi picked up a trainer.

“Remember the Olympic Stadium?”

I nodded.

“How it went 100 million over budget, wasn’t ready till 6 days before the Games and that poxy wind turbine collapsed on it?”

“Right.”

“So... that’s like a few thousand tonnes of concrete and they messed it up. This is a total global fuel revolution.” He looked across at me. “Better face it, this is at least our lifetime, maybe our kids’ too.”

“Kids? You want to bring kids into this?”

“Sure. Someday. I don’t know how it’s gonna work any more than you do, but I’m not going to stop living my life just cos of some shitty greenhouse gas.” (266–267).

Interestingly, the same observation is made here as in *Solar*, although in a rather more optimistic tone. The dialogue even mentions children, another delicate issue that is rarely mentioned in climate-change fiction. Adi, who later becomes Laura’s new boyfriend, provides her with the best philosophy to conquer despair, one that she later adopts as well, which is to continue living:

Adi came round and I buried my head on his shoulder and cried and cried and cried.

He whispered, “You’ve got to hold on.”

“Why?”

“Because... is all.”

I burst into tears again. “I can’t go on like this, Adi... What’s going to happen– ”

He stopped me. “Don’t. Day by day is all.” (374)

The only possible solution, Adi says, is to survive simply “because” and continue to hope without having any real basis for that hope – a philosophy that is also held by Laura’s elderly neighbour Arthur, a war survivor. Although hardly optimistic, this philosophy is the only one that seems to work in the changed world.

As a novel that combines the formula of teenage fiction with climate change as the main driver of the plot, *Carbon Diaries 2015* achieves two very important goals. As a climate-change novel, it focuses on many questions that are often left out in other novels, such as how climate change affects the most basic and seemingly unimportant parts of our lives (such as dating), whether it still makes sense to have relationships and children, and how the characters find enough hope to survive. These questions, combined with the mundane facts of everyday life with carbon rationing, detailed in the form of a diary, create a realistic impression of what life in such a world might actually feel like. This makes it in part more successful in presenting climate change as a clear and present threat. Not to mention, from the point of view of storytelling, it is very successful in making climate change an inextricable part of the plot.

As a teenage novel, *Carbon Diaries 2015* uses typical, time-tested formulae to create a narrative that helps teenagers see characters achieving the relevant “developmental tasks”. However, as we have seen, this is a novel that discusses unprecedented changes, and adapting to changes is not something only adolescents must do. Climate change, it could be argued, presents “developmental tasks” for everyone, and *Carbon Diaries 2015* presents a narrative that helps if not actually achieve them, at least come to terms with them.

Because *Carbon Diaries 2015* combines both a climate-change novel and a teenage novel, its being formulaic is a strength rather than a weakness. On the one hand, it is unsettling to find that a teenage novel, which we would expect to deal with simple personal problems, such as dating, or even slightly more serious societal ones, such as alcoholism or divorce, suddenly revolves around a problem of this scale and complexity. Climate change, it suggests, is a problem so immediate it cannot be avoided, for any literature. On the other hand, its being a teenage novel allows it to delve into problems that would seem too mundane or trivial for “serious” literature, thus making it much more accessible, and, in turn, much more real to readers of any age.

### Science Fiction and Climate-Change Fiction

Just like *Carbon Diaries 2015*, *The Windup Girl* has an inherent disadvantage as a climate-change fiction novel: it is considered to be genre fiction. As the winner of the 2010 Hugo and Nebula awards, it is undeniably classified as belonging to the science fiction genre. The same could be said about Margaret Atwood’s *MaddAddam*. Being classified as science fiction, as Amitav Ghosh claims, is one of the great threats to climate-change fiction: “fiction that deals with climate change is

almost by definition not of the kind that is taken seriously by serious literary journals: the mere mention of the subject is often enough to relegate a novel or a short story to the genre of science fiction. It is as though in the literary imagination climate change were somehow akin to extraterrestrials or interplanetary travel.” (11). Although Ghosh argues it is wrong to immediately dismiss climate-change fiction as “not serious”, he clearly accept what the definition of being “not serious” is, and that is science fiction, which, as he claims, amounts to “extraterrestrials” and “interplanetary travel”. He is not the only author to have such beliefs: even authors who themselves write works that could comfortably be classified as science fiction, have often expressed a dislike for the genre. Margaret Atwood preferred to use the term “speculative fiction”, claiming in an interview that “Science fiction has monsters and spaceships; speculative fiction could really happen” (qtd. in Potts, 2003), disregarding the fact that spaceships already exist and, depending on the precise definition, so do monsters. Moreover, there is hardly a meaningful distinction between “science” and “speculative” in this definition – both are based on present tendencies and depict a future altered by them. This could mean a novel could still be bad if it is inspired by bad science or baseless speculations, but there is no meaningful difference in the definition itself, other than the negative association stubbornly clinging to the words “science fiction”. Nevertheless, other authors have expressed similar opinions. Vladimir Nabokov famously stated: “I loathe science fiction with its gals and goons, suspense and suspensories” (117). Ian McEwan, when discussing his novel *Machines Like Me*, claimed it was not science fiction and argued that science fiction writers could explore the future “not in terms of travelling at 10 times the speed of light in anti-gravity boots, but in actually looking at human dilemmas.” (qtd. in Adams, 2019). All of these author’s efforts to distance themselves from the genre of science fiction reveal two important criticisms. The first is that it does not have well-developed characters and focuses more on technology than universal human dilemmas. Science fiction, as Nabokov says, includes only “gals and goons” and does not include what Ursula K. Le Guin calls Mrs. Brown, Virginia Woolf’s embodiment of human nature. According to Le Guin, it often seems that science fiction is capable of anything but exploring human nature:

Have we any hope of catching Mrs. Brown, or are we trapped for good inside our great, gleaming spaceships hurtling across the galaxy, antiseptic vehicles moving faster than the Richmond-Waterloo train, faster than the speed of light, ships capable of containing heroic captains in black and silver uniforms, and second officers with peculiar ears, and mad scientists with nubile daughters, ships capable of blasting other, inimical ships into smithereens with their apocalyptic, holocaustic rayguns, and of bringing loads of colonists from Earth to unknown worlds inhabited by incredibly sinister or beautiful forms of alien life, ships capable of anything, absolutely anything, except one thing: they cannot contain Mrs. Brown. (103).

Nevertheless, Le Guin asserts that not only is science fiction capable of containing Mrs. Brown, it is imperative that it should, otherwise it would not be worth writing at all: “if we can’t catch Mrs. Brown, if only for a moment, then all the beautiful faster-than-light ships, all the irony and imagination and knowledge and invention are in vain; we might as well write tracts or comic books, for we will never be real artists.” (113).

The second criticism is that science fiction is not entirely believable, leading Atwood to try to distinguish her work from science fiction. The conviction that science fiction is too far-fetched is shared by many writers, it seems, as is illustrated by “The Mundane Manifesto”, which calls for more believable science fiction, written by Geoff Ryman and the attendees of the 2004 Clarion West workshop. The manifesto calls for:

The bonfire of unexamined and unjustified science fiction tropes that these recognitions piles up and sets alight.

This bonfire of the stupidities includes, but not exclusively:

- Aliens: especially those aliens who act like feudal Japanese/American Indians/Tibetan Buddhists/Nazis or who look or behave like human beings except for latex.
- Alien invasions
- Alien Jesus/enlightened beings
- Flying Saucers
- Area 51
- Any alien who is a vehicle for a human failing or humor
- Aliens who speak English
- Devices that can translate any language
- Radio communication between star systems
- Traveling between galaxies without relativity effects on a consistent scale
- Slipping sideways into worlds other than this one where just one thing or all of history is different, only the clothes look a bit better, the hero is more powerful, the drinks are more delicious, and Hitler... (sfgenics.wordpress.com)

The manifesto also provides guidelines for what science fiction should focus on. These include: “A new focus on human beings: their science, technology, culture, politics, religions, individual characters, needs, dreams, hopes and failings... The number of themes and flavors open to Mundane fiction include robotics, virtual realities, enhanced genomes, nanotechnology, quantum mechanics...” (ibid.)

The manifesto’s main message, however, is more than simple frustration with repetitive and predictable tropes that have no basis in science. Crucially, the authors of the manifesto also state that “interstellar travel remains unlikely... magic interstellar travel can lead to an illusion of a universe abundant with worlds as hospitable to life as this Earth. This is also unlikely...this dream of abundance can encourage a wasteful attitude to the abundance that is here on Earth.” (ibid.) The

conclusion of this “mundane” science fiction may as well be the conclusion of a manifesto for climate-change fiction: “The imaginative challenge that awaits any science fiction author who accepts that this is it: Earth is all we have. What will we do with it?” (ibid.)

It could be argued that science fiction and climate fiction face many similar challenges. Both must grapple with bringing real science into fiction; both are criticised for being unbelievable; both are often not taken seriously; both are criticised for focusing on something other than human nature and portraying depressing dystopian visions of the future that have little to do with the lives of people today. However, these criticisms are not always justified, as Michel Faber explains: “*Under the Skin* was discussed on BBC Radio 4’s Open Book recently and the three presenters tried their best to argue that it wasn’t really sci-fi because it was beautifully written and had such strong characterisation and profound themes” (qtd. in Ditum, 2019). In other words, if a work of fiction was good, it was tempting to classify it as something other than science fiction, just as Atwood did, preferring the vague term “speculative fiction”.

The question that can be raised here is what can be gained by writing a science fiction novel that focuses on climate change. On the one hand, it risks simply making the threat of climate change less credible, as Ghosh claims, and as is evident from the popular usage of the term “science fiction” to simply mean “incredible”. In fact, the OED lists “science fiction” as a synonym to “fantasy”, along with “myth”, “legend”, “fairy tale”, and, intriguingly, “escapism”, suggesting that classifying a novel as science fiction may achieve the opposite of the goal of climate fiction by making it seem an escapist work rather than one that helps face immediate realities.

On the other hand, drawing inspiration from science fiction can have some undeniable advantages for climate-change fiction. Firstly, it could draw on a long tradition of including scientific predictions into fiction. Secondly, it could draw inspiration from the different forms of science fiction, which ranges from “hard” science fiction that focuses on technology and its possibilities to “soft” science fiction, which is concerned with the social aspects of the future (and includes such works as Huxley’s *Brave New World*, Orwell’s *Nineteen Eighty-Four*, and Atwood’s *The Handmaid’s Tale*) (Sterling, 2019). Also, despite frequently providing commentary or critique of present-day society, science fiction has never lacked popularity; in fact, it has been suggested that simple jealousy of its success has led authors of other types of fiction to view it with contempt (Ditum, 2019), which would be an asset for climate-change fiction as raising awareness is certainly one of its goals. Finally, science fiction would be much more accommodating to what Ghosh calls the “improbable” and the “uncanny”, as it is by definition more imaginative than other types of fiction. Moreover, it has been suggested that by being less respectable than other genres, science fiction benefited from more diverse voices:



As a student, the American writer Joanna Russ was taught that women lacked the universal perspective from which to create literature (one of those who taught her was Nabokov). Genre fiction gave her a way back to writing: “Convinced that I had no real experience of life, since my own obviously wasn’t part of Great Literature,” she wrote in 1983, “I decided consciously that I’d write of things nobody knew anything about. So I wrote realism disguised as fantasy, that is, science fiction.” (ibid.)

“Realism disguised as science fiction” could easily be the definition of climate-change fiction. It is clear that science fiction and climate-change fiction have a close if ambiguous relationship, which is why it may be useful to examine works that can be classified as science fiction but are dealing with climate change as well. To do this, Paolo Bacigalupi’s *The Windup Girl* and Margaret Atwood’s *MadAddam* will be examined here.

### *The Windup Girl* by Paolo Bacigalupi

*The Windup Girl*, Paolo Bacigalupi’s debut novel, is set in Thailand in the 23<sup>rd</sup> century. By then, the world’s oceans have risen significantly, and Bangkok is surrounded by walls to protect it from flooding. Without carbon fuel sources, the world must resort to manually wound springs for energy. Plagues and frequent catastrophes have almost completely destroyed food sources, which is why biotechnology has become dominant, leaving only a few mega-corporations controlling the food supply by producing genetically modified plants. The countries that do not comply are attacked with bioweapons, private armies, and economic hitmen. Thailand, however, still has a natural seed reserve, making it a very powerful country, which is nonetheless constantly under threat from the mega-corporations and their spies, one of whom is the only Westerner in the story – Anderson Lake, an economic hitman and the representative of the mega-corporation AgriGen. He runs a company that is supposed to produce a new type of spring that would be much more powerful, but his is simply a shell company to hide his true aim of robbing the seedbank. While searching for information, he meets an illegal Japanese “windup”, a genetically engineered woman Emiko, who was abandoned by her owner and forced to work in a sex club. Meanwhile, Lake is being spied on himself, by Hock Seng, a refugee who runs Lake’s factory and is trying to steal the plans for the new spring. At the same time, the two most powerful ministries, the Environment Ministry and the Trade Ministry, fight over power while trying to both obtain wealth and influence and preserve the country.

Before examining the novel more closely, I should note that it has been suggested that the science on which it is based is not flawless. One of such criticisms claims that the novel lacks

scientific coherence, which is illustrated by the cheshire cat – a genetically engineered cat similar to that of Lewis Carroll, which can turn invisible at will. It has bred with regular cats and, because of its invisibility, became a wide-spread and dangerous predator that has wiped out numerous other species. It has been pointed out, however, that the time span given in the novel is not nearly enough for just a few individuals to become so widespread, even if they did mix with regular cats. Moreover, it would be immensely complicated to create a hairy animal that can blend into its environment so perfectly it becomes invisible (which would make its ability much more advanced than that of a chameleon). However, the explanation to how the cats came to exist makes their creation seem simple: “Hock Seng has heard that cheshires were supposedly created by a calorie executive—some PurCal or AgriGen man, most likely—for a daughter's birthday. A party favor for when the little princess turned as old as Lewis Carroll's Alice” (41). The problem, it has been pointed out, is that if it were so easy to create a new species that one could be invented as a simple gift for a birthday party, creating new sources of food would not require robbing food banks, making the sources of conflict between the countries vanish. There have also been other inaccuracies in the science of the novel, suggesting that Bacigalupi “has read about possibilities and concerns inherent in genetic engineering, but he does not have a firm foundation on the science behind these technologies” (Schaller, 2015).

Despite these inaccuracies, the novel has received widespread praise, and has been suggested as a good example of the aforementioned “mundane” science fiction: “Hewing rigorously to contemporary realities and science, focusing on near-term futures, this kind of science fiction eschews the glories of space opera and time travel and other extravagances for meticulous blueprints of our probable paths through the rough decades ahead.” (Broderick, Di Filippo 276). The novel’s appeal, then, lies in its focus on the foreseeable future, which, in the age of climate change, is more unexpected and intriguing than any “space opera”.

What, then, does Bacigalupi see as the probable paths through the future? Notably, although his novel is categorised as science fiction, its strengths seem to lie not so much in the science, as in fiction, most notably the realist depiction of human nature, or, as Le Guin would call it, the search for Mrs. Brown. It has been noted that even in a fiction world that is so different from our own that it is barely recognisable, Bacigalupi “neatly folds complex ideas about gender, race and ethnicity into the plot without giving solutions, acknowledging that in a broken future there’s no reason to assume that our understanding of one another will be any less broken.” (Masad, 2010). Indeed, in this fictional Thailand, racism and fear of foreigners abounds, as is clear from the fearful attitudes of Hock Seng, a Chinese refugee, whose behaviour is described as “the twitch of a man fearing bloody slaughter every time a door opens” (21). Despite this, he himself is not any more charitable towards other foreigners, most notably his boss Anderson Lake. He is frightened by the Westerner’s appearance:

“The foreign devil’s pale skin and blue eyes are truly horrific. As alien as a devil cat” (44), but finds his personality and mental capacities contemptible: “It’s maddening to work with the creature. The devil’s moods are mercurial, and always aggressive. Like a child. One moment joyful, the next petulant. Hock Seng forces down his irritation; Mr. Lake is what he is” (40).

However, the most notable symbol of the changes in humanity is the “windup girl” of the title, Emiko, a genetically engineered New Person from Japan. The New People are a race of genetically engineered people, optimized for a certain task: some are made to be efficient workers, others to be deadly soldiers. Emiko, however, is simply made to look pretty, to be a companion and sex toy for rich men. Her beautiful appearance is achieved mostly through her impossibly smooth skin, which has pores so small they are barely visible, making her beautiful but prone to overheating as she cannot sweat. This way, she also becomes an object of luxury – to survive, she needs ice, which in a world affected by global warming is available only to the highest classes. After the lesson with cheshire cats, she is controlled by making her infertile and programming her to be obedient to her master and even to orgasm at the required time despite her own feelings. However, we later learn that she can be disobedient and even dangerous, when she kills after being driven to the edge. Despite her power, she is helpless in Thailand as she is illegal there, and is therefore in constant fear of being discovered and killed, which is made easier by her characteristic “stutter-stop” movements, leading locals to derogatively refer to her as “heechy-keechy”.

Although the human-like automaton in science fiction is so common it has become a cliché, Emiko’s character poses some interesting questions. One, certainly, is whether she can be considered human. Yet in a world so heavily altered by gene modification, with the line between what is natural and what is human-made so blurred, can this question even be posed? Notably, the surviving religions all agree that Emiko is not human, at least not in the eyes of God. The New People are described as “the devils that the Grahamites [a religious cult] warn against at their pulpits... soulless creatures imagined out of hell that the forest monk Buddhists claim... creature[s] unable to ever achieve a soul or a place in the cycles of rebirth and striving for Nirvana... [an] affront to the Q’ran” (52). However, these religions themselves seem to be out of touch, especially the Grahamites, likely named after two famous twentieth-century American evangelists, who advocate a natural world and are described as “so focused on their Noah’s ark, after the flood has already happened” (159). As Scott Selisker points out, “With frequent reference to Eden and the Biblical flood, the Grahamites’ desire to reclaim the natural becomes tantamount to a desire for time travel or global annihilation, since these are the only solutions for returning the world to a state of natural purity.” He argues that “By positioning the Grahamites as figures of ridicule in the novel, Bacigalupi shifts the terms of the argument about GMOs from appeals to the natural to appeals to ethics” (504). In other words, what is more important

here is not whether Emiko is human or not, but whether the people around treat her as such and what their attitudes reveal about the persistence of human nature even in a barely recognizable future world. The most important question here is why Emiko was created at all, because being neither a worker nor a soldier she is not, strictly speaking, necessary. The question bothers Emiko herself:

She wonders if she were a different kind of animal, some mindless furry cheshire, say, if she would feel cooler. Not because her pores would be larger and more efficient and her skin not so painfully impermeable, but simply because she wouldn't have to think. She wouldn't have to know that she had been trapped in this suffocating perfect skin by some irritating scientist with his test tubes and DNA confetti mixes who made her flesh so so smooth, and her insides too too hot. (53)

Emiko's design could be flawed, but it could also be deliberate, as her impenetrable skin makes her both beautiful and more obedient, as she could hardly try to escape when she is so prone to overheating. In addition, she becomes a signifier of wealth, as only the richest can afford to keep her comfortable. Regardless of whether her flaws were ignored or created purposefully, the existence of Emiko reveals a degree of cruelty on part of the humans who have created her.

Notably, her plight is reminiscent of utterly non-fictional creatures in the real world that have been designed to be pretty regardless of their suffering. A good example of that is brachycephalic (or flat-faced) dog breeds, including Pugs and Bulldogs. The shape of their snouts is a characteristic that makes them attractive for pet owners, which adds to their popularity; however, this feature causes the majority of them to experience problems no less dire than the imaginary New People's. According to the Universities Federation for Animal Welfare, these include "exercise intolerance (inability to cope with exercise), mouth breathing, gagging, restlessness, rapid breathing (tachypnoea), cyanosis (blue coloured membranes of the mouth – due to lack of oxygen in the blood), dysphagia, abnormal posture, and intermittent collapse due to respiratory compromise", not to mention vomiting, eye problems, sleep disorders, and, notably, heat strokes ([ufaw.org.uk](http://ufaw.org.uk)). Pugs are not created through genetic modification, but the similarities suggest that the issue of creating beautiful creatures destined to suffer their entire lives is by no means a new problem in human interaction with nature.

Another point of interest with Emiko is how the people of the story treat her. After being abandoned by her owner, she finds work in a Thai sex club, where clients pay good money to see her beaten and raped by other prostitutes. Although the men gather to watch her and occasionally even sleep with her, they express nothing but disgust towards her:

The men laugh at her strange gait and make faces of disgust that she exists at all. She is a creature forbidden to them. The Thai men would happily mulch her in their methane

composting pools. If they met her or an AgriGen calorie man, it is hard to say which they would rather see mulched first. And then there are the *gaijin*. She wonders how many of them claim membership in the Grahamite Church, dedicated to destroying everything that she represents: her affront to niche and nature. And yet they sit contentedly and enjoy this humiliation of her even still. (56).

Although the men express disgust, it is clear Bacigalupi wants the reader to experience disgust with the men themselves rather than the genetically modified and unnatural human being they are watching. As Selisker explains, Bacigalupi creates “an aesthetics of disgust, but with a key difference from what is usually encountered with chimerical GMOs: instead of the organism itself provoking disgust, the audience stages a way of looking at another creature, and a larger network of exploitative interactions, that we find disgusting.” (512). In other words, unlike in many other science fiction stories where genetically modified organisms are disgusting or terrifying, Bacigalupi’s are merely different. He does not invite the readers to question the line between natural and unnatural. As the Grahamites illustrate, the question is irrelevant, as everything is in some way unnatural.

However, there is one more reason why the genetically modified Emiko and the natural humans are more similar than different, and that is the way they are both exploited by capitalism. As she watches the men who loathingly observe her, she thinks “[i]f they met her or an AgriGen calorie man, it is hard to say which they would rather see mulched first”. This reveals not only the two most hated classes of inhabitants, but also the common way of disposing of them – by putting them in methane composting pools, thus essentially using their bodies to create more food and, in turn, energy. As Lars Schmeink explains, “The reference to the calorie man, a similarly illegal invader of Thailand, though entirely human, here indicates the inhuman system, which would see no calorie of energy wasted.” (81). It could be argued, of course, that “the calorie man”, as both a foreigner, a spy, and a very clear threat not only to Thailand, but all countries, is not seen as entirely human as well. But this would only highlight the inhumane hierarchies that exist in this society, the boundary of who is considered human enough not to be reduced to energy being pushed ever further.

Before she is tortured at the sex club, Emiko is consoled by her boss’ constant phrase that “money is money, and nothing is new under the sun” (52). Even as she is tortured, she thinks “Even if she is New People, there is nothing new under the sun” (57). Indeed, that phrase could be used to sum up the entire novel. Although it is set in a distant future, Bacigalupi reveals over and over that it is all simply an extension of what people have been doing for centuries. The genetically modified organisms, be they plants, animals, or people, are simply an extension of technologies of selective breeding and cultivation. The reasons to tamper with nature are also depressingly similar: creating better workers to be exploited, better soldiers, prettier toys. Or, in the case of cheshires, there is hardly

any reason at all, but a reckless mistake whose consequences are much more serious than expected. The way people approach these new organisms is also familiar: the giant, elephant-like megodonts are exploited like many farm animals before them, cheshires are hunted and killed like many pests before them, and Emiko herself is abused as many racial minorities or women have been before. The “exploitative interactions” that Bacigalupi draws our attention to, are in no way new, nor is the capitalism that motivates it. It is these interactions, then, that should be examined, and become ever more important and clear with great changes in how energy is made, how food is grown, or what different organisms are created by people.

Notably, the novel ends with a flood that wipes out nearly all of Bangkok. Its sole survivors are Emiko, a genetic engineer named Gibbons, and his transsexual lover named Kip. Although Emiko is sterile, Gibbons takes a sample of her DNA, promising to create other New People who would be able to reproduce. According to Andrew Hageman:

One way in which the finale coincides with the Noah narrative is in the preservation of the Thai seed bank for a post-flood new start, Kanya having sent the genetic archive out of the city before flooding it. The final flood in *The Windup Girl* swerves from its Judeo-Christian counterpart, however, in sharp contrast to the terms of the biblical preservation of those “human beings” deemed by God to be worthy to repopulate the Earth. The people who remain in Bangkok despite the flood are a heterogeneous group that disrupt any conventional sense of “human” purity (300).

As Hageman explains, this suggests “the possibility for a new ecological paradigm to emerge” (ibid.), as the trio is not only an unconventional group of survivors, they are also the only ones in the entire novel to show hospitality to the hated mutant cheshire cats. With humanity and its exploitative interactions out of the way, a new future can be built. However, Hageman notes that Bacigalupi does not make the ending quite so simple by including a problematic layout of Gibbons’s views on genetic modifications (297):

The ecosystem unravelled when man first went a-seafaring. When we first lit fires on the broad savannas of Africa. We have only accelerated the phenomenon. The food web you talk about is nostalgia, nothing more. Nature....We are nature. Our every tinkering is nature, our every biological striving. We are what we are, and the world is ours. We are its gods. Your only difficulty is in your unwillingness to unleash your potential fully upon it. (322)

As Hageman explains, his views are rather unsettling as “Gibbons makes a disturbing return to an ideology of deity and power. Despite the hospitality he shows to Emiko and the cheshires, Gibbons still frames his vision of the future in terms of “gods” with dominion from a position atop a

hierarchy.” (ibid). Therefore, although the ending hints at the possibility of a new kind of humanity and a new kind of society, Bacigalupi reveals doubts over its superiority, or perhaps simply a fear of humanity being replaced.

It could be argued that the cheshire cats are also a good illustration of that fear. As Schmeink argues, “the cheshires become symbols of the fragility of natural hierarchies, in which the human sees itself at the top, at least for the moment: ‘A high-tech homage to Lewis Carroll, a few dirigible and clipper ship rides, and suddenly entire classes of animals are wiped out, unequipped to fight an invisible threat’ (*Windup* 114).” (85). However, as suggested earlier, it is highly unlikely that a new species could spread that fast or be that powerful. This means that although the cheshires are not, strictly speaking, scientific, but work well in fiction to reveal a few deep-seated fears: fear of humanity’s power, its inability to control it and tendency to make stupid mistakes, and, despite all humanity’s flaws, the fear that it will be replaced. It can be argued, then, that despite the futuristic setting, Mrs. Brown is very much present in *The Windup Girl*, her deepest fears and inadequacies explored in a fantastical (at least for now) context.

#### The *MaddAddam* trilogy by Margaret Atwood

Margaret Atwood’s *MaddAddam* trilogy is composed of three novels: *Oryx and Crake* (2003), *The Year of the Flood* (2009), and *MaddAddam* (2013). As mentioned before, it is not clear whether these works should be considered science fiction, as she herself has insisted on calling it “speculative fiction” rather than science fiction. However, according to Lars Schmeink, “large parts of the reading community have deemed the MaddAddam trilogy to be ‘science fiction’ and possibly even ‘biopunk’ (as witnessed in the original inclusion of the first two books in the Wikipedia entry [removed in 2010]).” (71). He himself claims it “functions as a liminal work on the demarcation line between ‘literary’ and ‘genre’ fiction” (ibid.). As such, the trilogy is a great example of “serious” literary fiction drawing inspiration from the imaginative worlds of science fiction to explore the meaning of being human in a world ravaged by climate change and altered considerably by genetically modified organisms.

The first novel, *Oryx and Crake*, focuses on “Snowman”, a man whose real name is Jimmy, living near a group of genetically modified humans called Crakers. The world is in a post-apocalyptic state caused by a worldwide plague, engineered by Jimmy’s friend Glenn, who begins to call himself Crake after an online game. Crake creates a supposedly superior race of humans, the Crakers, while also developing a pill called “BlyssPluss”, which offers happiness, health and unlimited sexual

prowess. Secretly, however, the pill causes sterilization and ultimately the plague, wiping out humanity and leaving only Jimmy, the Crakers, and a variety of genetically modified animals suddenly free to roam the world.

The second novel retells the same story of human extinction, but from a different, less privileged female perspective of Toby and Ren, two women who try to survive in the “pleeblands”, territories not secured from natural catastrophes, diseases and crime, unlike the “compounds”, in which Jimmy and Glenn are raised. Toby and Ren belong to a group called the God’s Gardeners, an ecological cult, with another “gardener” Amanda. Having accidentally survived the plague, the women reunite on a beach where Amanda is attacked by escaped convicts, Painballers. There, they are joined by Jimmy, who until then believed himself to be the last human being on Earth.

In the final novel of the series, the readers finally discover what happens after all the parties meet on the beach. Jimmy, the previous “gardeners”, and another group called the MaddAddamites, which has a virtual base in an online game called the Extinctathon, which was where Crake got his name in the first novel. The new community tries to create a home safe from the Painballers, as well as other threats, most notably the Pigoons, genetically engineered pigs that were bred to grow human organs for transplantation, including parts of the brain, which later led them to become so intelligent they were almost human. The group is also joined by the Crakers, and Toby’s long lost lover Zeb, which turns the narration back to pre-plague times, revealing the close cause and effect relations between the main characters. Notably, in the end three women realise they have become pregnant with part-Craker children after they had been raped (one character described the rape as a “cultural misunderstanding”). The story ends with one character telling the final stories to the new generation of Crake children.

Considering the trilogy’s complex plot, its post-apocalyptic setting and the many non-human but similar creatures that roam in it, it is easy to see why many are tempted to classify this trilogy as science fiction. It has also been suggested that the trilogy includes many common science fiction tropes, such as: “the mad scientist releasing the virus; the millenarian cults and cannibal gangs; the survivors subsisting, ironically, on throwaway consumer items; the tech-noir and cyber-punk stylings; flooded cities; the vine-wrapped skyscrapers...the proliferation of geeky names and terminology (“thopter”, “cell-pack ammunition”, “Swift Fox”, “Ivory Bill” etc.; Atwood’s attempts to write in youthful and hardboiled registers are not always successful).” In conclusion, the book has been said to “present an eccentric spectacle – of a fierce, learned intelligence... while writing what is essentially an epic B-movie.” (Tait, 2013). Despite this, Atwood’s trilogy has always been considered a novel worthy of academic attention, with scholars discussing it “in regard to a variety of topics – satire and humor, religion and myth, ecology, capitalism, technology, writing, and many more” (Schmeink, 72).



Schmeink also claims that Atwood “combines science-fictional tropes with realistic narrative technique” (72). The question, then, is what this type of combination can bring to both science fiction and “serious” literature, and whether it can be useful for the emerging genre of climate fiction.

One good example of this combination is the various descriptions of the pigoon. A pigoon, introduced in the very first book, is a pig with human organs introduced into it:

The goal of the pigoon project was to grow an assortment of foolproof human-tissue organs in a transgenic knockout pig host – organs that would transplant smoothly and avoid rejection, but would also be able to fend off attacks by opportunistic microbes and viruses, of which there were more strains every year. A rapid maturity gene was spliced in so the pigoon kidneys and livers and hearts would be ready sooner, and now they were perfecting a pigoon that could grow five or six kidneys at a time. Such a host animal could be reaped of its extra kidneys; then, rather than being destroyed, it could keep on living and grow more organs. (*Oryx and Crake* 27–28)

From a scientific point of view, the pigoons are not in any way extraordinary. Xenotransplantation has been around for a long time, with the first attempt carried out as early as 1905, when a French doctor tried to transplant rabbit kidneys to a patient (sadly, the patient died 16 days later). Since then, a number of other animals have been used, including pigs, goats, and various primates (Reemtsma, 1995). Recently, it has been concluded that “Xenotransplantation is a promising strategy to alleviate the shortage of organs for human transplantation” (Dong Niu, Hong-Jiang Wei, et al., 2017). Notably, the study on xenotransplantation by Keith Reemtsma includes more than just the science-oriented questions, such as has xenotransplantation ever worked and which animals can be used for it most successfully, but also questions such as “Is it *ever* acceptable, from an ethical point of view, to use nonhuman animals to treat human illness?” (emphasis original) (12). Moreover, the paper begins by claiming that “Daedalus, who grafted bird feathers to his arms, was perhaps the first to transplant across the species barrier successfully. He escaped from his island prison in Crete and flew to the mainland of Greece. A similar experiment by his son, Icarus, ended in acute graft rejection, attributed to a thermolabile adhesive” (9). Though simply an academic joke, this description weaves together science, myth, and humour, to reveal the complex ways in which we understand and evaluate xenotransplantation.

It is interesting to note that the fictional pigoons are also described in a similar manner. The choice of pig for a host animal is entirely believable, as genetically pigs are similar to humans and this type of experiment has been carried out in modern times. However, the choice of a pig also adds deep-seated negative associations, and not only from a Euro-centric point of view: for example, the Chinese mythical figure Chu Pa-chieh is a mostly negative character in ancient Chinese literature.

Chu Pa-chieh occupied the high office of Overseer-general of the Navigation of the Milky Way when, in a drunken state, he assaulted the daughter of the ruler of the first Heaven, Yü Huang, and as punishment was sent to Earth where he accidentally entered the womb of a sow and was born half-pig. He then ate his mother and siblings, turning into a foul monster, until, after finally returning to a virtuous life, gained the possibility of rehabilitation (Werner, 335). It has been concluded that “pig-human hybrids represent descent and the grotesque, a capitulation to the basest appetites, rather than self-improvement or deception, as is the case for other creatures” (Mair, 129). The pigoon figure can also be interpreted a symbol of degradation and “capitulation to the basest appetites”. However, the question is whether it is the people being contaminated by pig-like qualities, or the other way around – the pigs are being implanted with human qualities, making them lesser creatures than they were before. Either way, the pigoon seems to be both a scientific possibility and a frightful mythical figure with various negative associations.

However, as the story progresses, the pigoons become more and more human-like. Before the plague, while the pigoons are still being grown in the laboratory, Jimmy already feels they are very much like him, and thus feels a certain sympathy for them: “‘Pigoon pie again,’ they would say. ‘Pigoon pancakes, pigoon popcorn. Come on, Jimmy, eat up!’ This would upset Jimmy; he was confused about who should be allowed to eat what. He didn’t want to eat a pigoon, because he thought of the pigoons as creatures much like himself. Neither he nor they had a lot of say in what was going on.” (*Oryx and Crake*, 29). However, what begins as simple sympathy and more likely than not just Jimmy’s projection of his own feelings towards non-human creatures, later changes as the pigoons gain more and more human qualities. After the plague, they become wild and begin hunting people for food in an organized manner, by attacking together, keeping watch, or even faking retreat if it suits them. According to Jimmy, they “are clever enough to fake a retreat, then lurk around the next corner... a brainy and omnivorous animal, the pigoon. Some of them may even have human neocortex tissue growing in their crafty, wicked heads.” (*Oryx and Crake*, 284). But their development does not stop there. As Schmeink explains:

[I]n *MaddAddam*, the final novel of the trilogy, Atwood goes so far as to endow the pigoons not simply with the agency to find a natural niche, attack the humans threatening their niche, and create an animal culture, but also with enough intellectual reasoning power to become fully subjective posthuman creatures. The novel’s concluding parts reveal a tribal community of pigoons, capable of interspecies communication, politics, law, and diplomacy. (93)

In *MaddAddam*, the pigoons even gain the possibility of communicating with people through a translator, one of the Crakers, who understands their speech. Thus they engage in negotiations,

offering a ceasefire, and even evoking human sympathy (and certainly that of the reader) by bringing a dead piglet, which they call “the tiny one” (269), who has been killed by people.

Atwood goes even further by not simply humanising the pigoons, but also describing them in a manner that approaches satire. The pigoons are depicted enjoying a swim in the swimming pool, where “the older sows and boars take brief dips, then watch over their piglets and shoats indulgently, lounging at the poolside” (*MaddAddam* 284); later, as a few piglets break the truce with humans and enter a vegetable garden, they are chided by the older pigoons. As Schmeink argues: “Pigoons as military masterminds, as summer guests at the poolside, or in the roles of disobedient, rebellious youth and shamed, disapproving parent – all of these are blatantly anthropocentric, not due to narrative unreliability or translational distance.” (95). Although Atwood begins with a strictly scientific description of the pigoons as a scientific possibility, she later slips easily into anthropomorphism and satire reminiscent of *Animal Farm*. It is probably unlikely that pigs could have such traits even after having parts of the human brain implanted, but, unlike with the cheshires in *The Windup Girl*, the criticism that this is not scientific seems inappropriate. This is clearly done deliberately: instead of providing a convincing and scientifically coherent plot, Atwood uses every tool available to the writer, be it satire, fantasy, myth, or hard science, to create a stranger, more disturbing fictional world, and pose more profound questions about the condition of being human in a changing world.

This mixture of writing modes represents a fruitful combination of science fiction and literary fiction. With a deep and imaginative look at the underlying issues, the *MaddAddam* trilogy becomes a great piece of fiction despite displaying many science fiction clichés. The story can be understood from many different perspectives, revealing that bringing climate change into fiction requires more than simply creating a plot with convincing climatological predictions incorporated into it. It requires bringing different types of storytelling together to examine human experience and prepare for the future. Interestingly, this is done in the novel as well, with the Crakers being told stories to understand the world as it is and was: first, by humans, then, in the end, by Blackbeard, another Craker, revealing the different voices telling the stories that shape the understanding of the world.

Amitav Ghosh has lamented the fact that climate change is hardly making its way into “serious” literary fiction. This does not mean, however, that it is not present in fiction: it exists and has existed for a while on the fringes of literature, genre fiction, not “serious” fiction, most notably science fiction. “The Mundane Manifesto” recognised the power of fiction to form attitudes toward the natural world and the existing need for works that address the unknown awaiting in the near future more than a decade before *The Great Derangement* was published. It is clear that science fiction has

much to offer in terms of imagining the future and liberating literature from the conservative realism that it still dwells in. It is clear, too, that the science fiction of today is, as Joana Russ put it, “realism disguised as science fiction”, posing questions about the very essence of being human, which is being challenged by new developments in science and profound changes in the environment; questions which “serious” literature overlooks.

Meanwhile, the seriousness of these questions is being recognised even in the most formulaic genres, such as teenage fiction. Just like awkward first crushes, bad grades and fights with adults, climate change is a fact of life and must be spoken about. And although this realisation has not yet reached “serious” literature, one thing is becoming apparent – it is not possible to discuss the human condition, or, in Le Guin’s words, to catch Mrs Brown, without speaking about climate change.

## Climate Change in Children's Literature

In 2018, the United States Court of Appeals for the Fourth Circuit retracted a permit granted by the US Forest Service to the Atlantic Coast Pipeline to build a natural gas pipeline in two national forests. In the official court documents, the judges argued against the permit by quoting a beloved author of children's literature, Theodor Seuss Geisel, more commonly known as Dr Seuss. The document read: "We trust the United States Forest Service to 'speak for the trees, for the trees have no tongues.' (Dr Seuss, *The Lorax* (1971)). A thorough review of the record leads to the necessary conclusion that the Forest Service abdicated its responsibility to preserve national forest resources." (southernenvironment.org, 60).

*The Lorax* is a rhyming tale that narrates the story of a creature called the Once-ler, who arrives in a beautiful valley which is home to various animals and is full of Truffula trees. The Once-ler discovers that he can use the Truffula trees to make a piece of cloth called the Thneed, which is extremely versatile and can be used for anything from shirts to bicycle seats. However, he is confronted by a strange little man named the Lorax, who comes out of the tree stump to "speak for the trees" (29). He scolds the Once-ler for his greed and urges him to do no harm, but, soon a man arrives and buys the Thneed for "three ninety-eight" (32), convincing the Once-ler that his business must be continued. Predictably, soon enough there are no more Truffula trees left and the Lorax departs, leaving a pile of rocks spelling "unless". The Once-ler does not understand the message until the very end, in which he has a revelation:

"But now," says the Once-ler,  
"Now that you're here,  
the word of the Lorax seems perfectly clear.  
UNLESS someone like you  
cares a whole awful lot,  
nothing is going to get better.  
It's not. (64).

Despite its simplicity, the message seemed to have made an impression on the federal court judges. However, it is interesting to note that this was not the only time *The Lorax* has led to activism. In 1988, a second-grader in Laytonville, California read *The Lorax* at school, after which he confronted his father, who worked as a lumber. According to newspaper reports, the boy told his father: "If you cut down a tree, then it's just like someone coming in and taking away your home." (Arias, McNeil). His father, however, was not impressed and blamed the school for "brainwashing"

the children to oppose the main source of employment in the town, calling for the book to be banned from the children's reading lists and even writing an advertisement in the local newspaper, which claimed: "We've got to stop this crap right now!"

The incident led to long and bitter debates in the local community about academic freedom, censorship, and ecology. The story became so famous that after some time, the author himself weighed in, explaining that his story "is about people who raise hell in the environment and leave nothing behind. I'm not saying logging people are bad. I live in a wooden house and sit in a wooden chair" (ibid.)

Finally, however, the school decided against removing the book from the curriculum. Yet the child's mother nevertheless insisted that the book should at least be read at an older age: "I don't mind *The Lorax* being taught to a child at an age when they don't have such a black-and-white view of good and bad. But it's stressful on the child when he has to choose between Dr Seuss and Daddy." (ibid).

These real-life events illustrate a number of factors that must be considered when discussing climate change in children's literature. The first is the power of its impact: despite obviously not being what could be called "serious" literature, despite their short, simple, and predictable narratives, and even despite being, in Kim Stanley Robinson's words "so didactic, so obviously meant to warn and teach us" (*Everything Change* 8), it does not lose its power as fiction. On the contrary, it is such a powerful piece of fiction that it was *The Lorax*, and not any number of great nature poets or novelists that the judges decided to quote in their rationale to protect national forests. The book's impact is also clear in the second story, proving the lasting impression it has made on both children and adults.

The second thing to note is its power to lead to activism. Both the judges and the schoolboy were not satisfied with simply reading *The Lorax* and dismissing it as fiction; they were compelled to act. As naturally more impressionable readers, children are likely to take the environmental message to heart and act on it. In addition, a child who advocates environmentalism is likely to attract the adults' attention as well.

This leads to the third factor, which is the backlash such a book is likely to receive. In times of fierce debate (at least in the United States) over the reality of climate change, it is obvious not all parents are willing to allow their children to be taught about environmentalism, leading to bitter fights about values and who has and should have the power to instil them in children. As we have seen, parents might even be placed in a position where their children are forced to choose between "Dr Seuss and Daddy".

Notably, this also highlights a serious dilemma of environmentalism and poverty: despite the poor often bearing the worst effects of climate change, many of the people who work in industries

harmful to the environment do so because they have no other choice. The aforementioned incident is a good example: the boy's father worked as a logger in what was described as "single-industry lumber town", meaning he had little choice if he wanted to continue supporting his family. On the other hand, although it does seem unfair to make a child choose between Dr Seuss and his father, it is also unfair to make a child choose between his family and a future on a habitable planet.

Finally, Dr Seuss' reaction to the incident was also instructive. As Amitav Ghosh put it, when speaking of climate change, "authenticity and sacrifice become central to the issue, which then comes to rest on matters like the number of lightbulbs in Al Gore's home and the forms of transport that demonstrators use to get to a march" (88). Any advocate of environmentalism must be without ecological sin; needless to say, few can claim that their lifestyles don't harm the environment. Despite the logical fallacies inherent in this approach, its pervasiveness can be seen in the fact that Dr Seuss thought it necessary to explain that he was not "against loggers" because he "live[s] in a wooden house and sit[s] in a wooden chair."

Bearing all of these factors in mind, it could be suggested that children's books on climate change could be seen more as a type of activism and less as literature. As we have seen with *The Lorax*, being obviously didactic is not necessarily a flaw for a children's book – on the contrary, the message the book is trying to convey is often seen as paramount. This, of course, leads to multiple difficulties. The first is to convey to children that their future is uncertain and dangerous because of climate change that has been collectively caused by people, and doing so in a manner that incites action rather than despair or anger towards the adults. On the other hand, a children's book must by definition be entertaining, with light, memorable, creative language, and illustrations that are often just as important as the text. What's more, the science included in these books must not only be accurate, but also simple.

To see the solutions that have been presented to this problem, several children's books on climate change will be examined here: *The Lorax* by Dr Seuss, *The Tantrum that Saved the World* by Megan Herbert and Dr Michael E. Mann; *George Saves the World by Lunchtime* by Dr Jo Readman; *The Trouble with Dragons* by Debi Gliori; and *Where's the Elephant?* by Barroux.

#### *The Lorax* by Dr Seuss

Although it was first released more than almost 50 years ago, *The Lorax* remains a children's classic, with a film based on the book released as late as 2012. In part, this is certainly due to the memorable rhymes and bewitching illustrations that characterise all of Dr Seuss' books.

However, its enduring appeal is also due to its message, which, instead of becoming obsolete, has become more and more relevant. Despite being oversimplified at first glance – greedy manufacturers are fought by heroic environmental activists – it does include more complex ideas. Some of them can be seen in the eerily accurate depiction of the greedy manufacturer, the Once-ler.

The Once-ler, a once successful businessman, is first presented as Scrooge type of character, living alone in a dark house away from the city. True to his character, he only values money, telling his story only if you “toss in fifteen cents/ and a nail/ and the shell of a great-great-great-/grandfather snail” (12), which he then carefully counts “to see if you’ve paid him/ the proper amount” (14). He tell his story via a “Whisper-ma-Phone”, so only one person can listen to it (perhaps hoping to make another fifteen cents if someone else wishes to listen). Yet it is not only his greed and unsocial behaviour that makes him unattractive. Throughout the book, his face is never revealed, instead being depicted as detached arms ceaselessly chopping the Truffula trees or a pair of greedy, half-crazed eyes staring through some blinds, a terrifying depiction of faceless corporations ruining the homes and lives of smiling human-like animals such as Bar-ba-loots, Humming Fish, and Swomee-swans.

The Once-ler also embodies many other aspects of capitalism, some of which may be more familiar to parents than children. One good example is the price at which he sells his first Thneed – 3,98, simultaneously an old business trick to convince people the price is closer to three than four, and emphasise the rise of cheap goods that are so ubiquitous today, harming both the environment and workers. The Once-ler's goods are also referred to as “a Fine-Something-That-All-People-Need” (30), reminiscent of Margaret Atwood’s cures for imagined ills in *Oryx and Crake*. All of these present seemingly innocent marketing tricks that have much more serious consequences than perhaps expected 50 years ago.

Meanwhile, the Lorax has been described as “a parody of a misanthropic ecologist: ‘He was shortish. And oldish./ And brownish. And mossy./ And he spoke with a voice/ that was sharpish and bossy.’ (27)” (Marris, 2011). Despite his best efforts, however, he fails to have any impact and departs along with all the animals. He does, however, leave a one-word warning that: “UNLESS someone like you/ cares a whole awful lot,/ nothing is going to get better” (64). The message is strengthened by Once-ler leaving a single Truffula seed to a little boy to look after, which, according to Marris, “puts a lot of responsibility on small shoulders” (ibid.)

This may seem unfair, as the book does have a rather black-and-white view of environmental issues and does not mention the fact that everyone is implicated in it, for example, the boy in the story is noticeably not naked (What is he wearing? Could it be Thneeds?). Also, the author’s claim he was looking for a compromise seems not entirely true as the Lorax appears with the fall of the very first tree. The Once-ler’s assurances that “I chopped just one tree. I am doing no harm” (30) are later



proven to be worthless. The ending also implies that no saviour, no Lorax-type activist is going to achieve anything without the direct involvement of the reader. Putting so much responsibility on children without explaining the complexity of the problem may seem harsh. However, it could be argued that it also clearly reflects the reality of the situation.

*George Saves the World by Lunchtime* by Dr Jo Readman

Drawing on the seemingly ubiquitous superheroes, *George Saves the World by Lunchtime* depicts a young boy who wants to save the world, but is not quite sure how and asks his grandfather for help. Together with his little sister and grandfather, George spends his morning learning the “four Rs: reduce, reuse, repair and recycle” (8). The trio occupy their morning with various household chores, learning how to reduce their climate impact every step of the way, finally cycling out to reduce petrol use and having locally sourced lunch in a farmer’s market. The book ends with a happy note that the world has been saved.

Unlike that of the *The Lorax*, the fiction world in *George Saves the World by Lunchtime* is much brighter and safer. The majority of the action takes place indoors, and instead of the haunting illustrations of Dr Seuss, where the environment takes centre stage (be it the beautiful pre-Once-ler idyll, or the terrifying post-Once-ler wasteland) we see a kitchen, a living room, a small garden. And although George proclaims several times that he “wants to save the world”, it is not clear what he wants to save the world from. There are neither catastrophes here, nor small but impactful changes, and one wonders whether saving the world is simply George’s whim, something someone on television might have told him to do.

Notably, George is also uncomfortably close to the “white saviour” trope. Upon deciding to save the world, he is helped by a slightly younger, slightly less talkative sister, and sets out to complete various tasks to help the vague “others”, for example, give away his clothes to be reused by someone who needs them (these lines are accompanied by a picture of a dark-skinned boy), o recycle to save nature, although despite informative explanations of how certain actions can help, it is not clear what exactly is happening to nature and why it has to be saved. George’s only concern seems to be that his actions are not large or heroic enough (though his grandfather quickly assures him they are).

All that being said, it is worth noting that the book does include good explanations of how simple actions can help reduce impact on the environment, which is a useful habit to instil. But, bearing in mind that, according to a CDP report, only 100 companies are responsible for 71% of

global industrial GHG emissions (Griffin, 2017), it is not clear whether individual effort can actually change much. Moreover, there is no indication that saving the world (or, indeed, the climate change that the world needs to be saved from) disrupts George's life in any meaningful way. The title itself implies that climate change is something that will not even make you postpone a meal. This gives the impression that the environment must be preserved, but only by slight changes, largely maintaining the status quo. Certainly it could be argued that the book focuses on positive actions to avoid inducing environmental anxiety in small children. But it could also be argued that it aims to soothe adults, who can calm their consciousness by pretending to do their part in their children's education while avoiding any uncomfortable questions and truths.

*The Tantrum that Saved the World* by Megan Herbert and Dr Michael E. Mann

Unlike George's moderate efforts, this self-published children's book focuses on a much more forceful way to save the world, which is via anger. The protagonist Sofia, like George, lives in a nice middle-class home, safe from natural disasters and catastrophes; however, those suffering from climate change begin to show up at her door. The unexpected visitors include, among other things, a family from Kiribati, a polar bear, a Bengal tiger, farmers from Syria, and New England fishermen. Frustrated with their presence, Sofia tries to hide and ignore them, but soon realises she must help them. As she tries to seek help from many sources (including the president), she finds that her concerns are dismissed, with adults arguing she is only a child. Unable to control her emotions any longer, she throws a tantrum that finally makes the world listen. As Kottie Christie-Blick, an educational consultant advocating for the teaching of climate change in classrooms, explains:

My students especially liked the two-page picture of Sophia yelling to the world to take action about climate change. Instead of words we see all the colors of nature streaming forth from her wide-open mouth, as the narrator tells us, "It rumbled down streets, into towns of all lands./ It echoed in forests, on glaciers and sands. /People and creatures alike felt its force. /They ditched their distractions and looked for the source." (nsce.com)

The colourful images and Dr Seuss-like rhymes make the book accessible to children, but it could be argued that its main topic of environmental efforts being infantilised and pushed aside (the local government officers Sophia tries to contact dismisses her worries on the grounds that she is only a child and they have other things to do) as well as the frustration that comes with that is completely relatable to adults as well. As the co-author Megan Herbert explains:

Tantrums are seen as negative behavior, the last straw for a child with limited means to communicate their frustration to try to be heard... Right now, that feels like the position that we're in. The people who have the will to do something to stop the burning of fossil fuels are being roundly ignored by the people who want to keep burning them. The time for polite conversation and reasonable discussion is past. It's time for us all to make a lot of noise and demand to be heard. As long as that tantrum is followed up by positive action, then I think it's completely justifiable. (qtd. in Platt, 2018).

Notably, this position provides a refreshing novelty compared to adult literature, in which any change in people's nature or capitalism is presented as impossible. The people who try to make a difference are often seen in negative terms. In *Flight Behaviour*, the butterfly-knitting activists are kind-hearted but ultimately ineffectual; in *Oryx and Crake*, Jimmy's mother, who becomes an activist, is seen as unstable and dangerous; in *Solar*, the environmentalists are either plain silly or simply looking for ways to capitalise on disasters. *Tantrum*, on the other hand, takes infantilising language that is often used to dismiss activism and transforms it into a force for change.

Notably, the book also includes a section on simplified climate science and an action plan that introduces ways to make a positive impact. It is by no means alone: popular science is also included in *George Saves the World by Lunchtime* and directions to websites that provide similar information are also added to new editions of *The Lorax*. This raises an interesting question whether *Tantrum* and the other children's books mentioned here should be classified as fiction or simply as non-fiction books with added engaging stories, as their message seems to be prioritised over the stories' value as fiction. However, there may also be books which tap into the emotional aspect of climate change without focusing on hard science. One of them is *Where's the Elephant?* by Barroux.

#### *Where's the Elephant?* by Barroux

*Where's the Elephant?* by French illustrator Barroux is notable for the fact that it is a picture book with almost no text, obviously aimed at the youngest readers. Inspired by Martin Handford's famous *Where's Wally?* series, the work is half-picture book and half-game in which children have to find several animals in lush and colourful vegetation. Although the task is difficult at first, with each page it becomes easier as the jungle in which the animals live is taken over by people who cut down trees to make space for new housing. Soon little is left of the original jungle, and the elephant and his friends have nowhere to hide. Like most children's books on the topic, *Where's the Elephant?*

hints at a happy ending: after their natural habitat is destroyed, the animals board a small boat and sail away, although it is not clear where they are going.

Although *Where's the Elephant?* is notable for its simplicity, it is a good example of how climate change can be illustrated through simple and evocative stories. It is interesting to note it does not include even simplified science, but that does not affect its emotional impact in any way. Through simple and colourful images, it conveys the most important idea behind environmentalism: that of shortage. The natural resources of the planet are finite; the elephant and human habitats cannot coexist if one of these is constantly expanding. Indeed, *Where's the Elephant?* may be a great book to explain the concept of unsustainability.

Another interesting aspect is that, as a picture book, *Where's the Elephant?* suggests a story rather than tells it, leaving it up to children to pose questions about what really happened and why. It is easy to see that this could lead to provocative situations for parents, who might not have certain answers or might not want to give them. Thus being forced to re-examine the situation, the parents may find the book emotionally impactful as well. Moreover, the book might bring memories of the *Where's Wally?* series many parents read in their childhood, leading to reflect on how much has changed since then.

#### *The Trouble with Dragons* by Debi Gliori

*The Trouble with Dragons* is in some ways a rather unusual book for children. This can be seen from the very first lines:

The trouble with Dragons is...  
Dragons make Dragons  
and they make some more  
till' there are wall-to-wall Dragons  
making Dragons galore. (3)

The lines are illustrated with a group of dragon-parents happily fondling half-hatched eggs with baby dragons. Apart from the surprisingly direct reference to reproduction (“Dragons make Dragons”), it is unusual for children’s books to address overpopulation. Scientifically, it is certainly true that overpopulation can contribute to the effects of climate change, but any discussions on the topic are inevitably sensitive and fraught with inter-connected issues such as systematic inequality, wealth and power gaps, and racism. BirthStirke, a recent mostly-female movement claiming to “declare our decision not to bear children due to the severity of the ecological crisis and the current

inaction of governing forces in the face of this existential threat” admits that “giving air time to the population or child=emissions argument without tackling or mentioning wealth and power inequality is just an extension of the blinkered colonial entitlement that created ecological breakdown in the first place” (birthstrike.tumblr.com). Without getting into further discussions on whether individual choice to not have children is a good way of reducing impact on the climate and can there possibly be an ethical way of significantly reducing population, it can simply be concluded that this issue is one of the most sensitive and controversial when it comes to climate change. And although the children reading *The Trouble with Dragons* might not understand it, their parents certainly will.

The book goes on listing other problems: the growing population of dragons begins to spread, until “their houses and roads take up all of the space” (5). Then, naturally, the numerous dragons “eat all the food and drink all the drink”, as well as “throw parties and make loads of noise / and leave a huge mess after playing with their toys” (7). The dragons also cut down forests and “blow out hot air” (9), until the planet begins to heat, melting the poles, rising water levels, until the change is so great that the book instructs:

Say goodbye to the world  
in which you were born.  
Soon everyone else  
will have packed up  
and gone. (11)

Thus, all the animals (and even a grumpy Santa Claus) begin to go, leaving the ravaged planet to the dragons. As in other children’s books, it is not mentioned where the animals might be heading, leaving it to parents to decide how much of the harsh truth can be revealed.

Then, the plot takes an optimistic turn, with the lonely dragons begging the animals to stay and promising to change, to which the animals answer by giving advice on how to maintain an ecological lifestyle. Among the usual advice such as preserving trees and recycling, there is also a rarely seen piece of advice to “put less of our world / on the end of your fork” (21), illustrated by one dragon feeding its baby with some sort of green vegetables, and another munching on chicken and apparently being attacked by a flock of birds. As with overpopulation, the issue of choosing a vegetarian (or vegan) diet to reduce impact on the environment is both extremely important and hugely controversial, especially when it involves children: there is no shortage of press stories featuring enraged dietitians claiming this type of diet is unsuitable, not to mention cases of parents force feeding their children vegan diets reaching court (such as the case in 2016 in which Italian

parents lost custody of their child after feeding him a strict vegan diet, ruled by the court to be “incompatible” with his age (Andreis, 2016)).

Finally, the book ends with a cautionary note: “For if we can’t see / that our stories are linked, / then sadly, like dragons, / we’ll soon be extinct.” (25). The choice of representing people as dragons is rather interesting: it depicts people as both part of the animal kingdom and (as dragons are large lizards, very different from the birds and fluffy mammals such as rabbits and bears that represent the wilderness here, not to mention, mythical) also removed from it, just like human beings. Notably, it also suggests that, like dragons, people are inherently destructive and must fight against their nature to lead more ecological lifestyles – an assumption that is echoed in many of the adult novels discussed here. However, as the ending reveals, dragons are chosen for a much more terrifying reason, which is to suggest that without swift change the human race is soon to become as mythical as they are.

From this small sample of children’s books that address climate change, several insights can be drawn. First, it is easy to note that these books are all aimed at parents who want to introduce the concept of climate change to their children, preferably without scaring them so much they would not be able to sleep. For this reason, most of the books (perhaps only excluding those that are aimed at very small children) include popular science, explaining the causes and effects of climate change, and at least basic instructions of what can be done to help.

Interestingly, some of these books seem to be aimed at children (such as *The Tantrum That Saved the World*, which sees the world from the point of view of a child), and some seem to be created with parents in mind (such as *The Trouble with Dragons*, which boldly addresses complex and sensitive issues perhaps better understood by parents). Whatever the case may be, it is probably safe to assume most of these books are read by both parents and children, with the parents becoming co-creators: pointing out illustrations, creating characters’ voices, or answering any questions that might arise. All of which means the parents are confronted with how much they are willing to say and how they choose to explain a crisis of which they are both victims and perpetrators.

Not surprisingly, this is why most of the books focus on a positive ending, producing a way out, however unlikely it may be (such as animals getting on a boat and leaving, as they do in *The Trouble with Dragons*, *The Lorax*, and *Where’s the Elephant*). They contain many instructions on how to help the environment for the same reason. However, this rightly raises the most important question: what makes a children’s book on climate change a piece of art rather than an attractively presented environmental leaflet?

It could be argued that the most important aspect that separates the two is the work's power to evoke emotion. Be it the terror of the permanently invisible Once-ler, with his spidery hands wreaking havoc on the world; the heartache of homeless elephant, wordlessly boarding the boat and leaving; or the anger of a girl whose concerns are nonchalantly dismissed by supposedly smarter adults, these provide a meeting point for both children and adults, and a way to understand the issue more deeply than it can be understood by simply understanding the science of climate change.

## Conclusions

### The “Seriousness” of Climate Fiction

The thesis began with an argument posed by Amitav Ghosh that climate-change fiction “is almost by definition not of the kind that is taken seriously by serious literary journals: the mere mention of the subject is often enough to relegate a novel or a short story to the genre of science fiction” (11). As Ghosh argues, despite the fact that climate change affects every aspect of our lives, fiction that discusses it is seen as focusing on something distant, improbable and hardly relevant.

As we have seen, there are two problems with considering climate-fiction as not serious because it is similar to science fiction. One is that science fiction does not (or at least not entirely) deserve its poor reputation. It is clear from works such as *MaddAddam* that science fiction can and often does contain the elusive Mrs. Brown, even if she finds herself in a world very different from our own. On the other hand, works such as *Solar* can have Mrs. (or rather Mr.) Brown at their very centre but not tell us much about climate change – because however apt and funny a caricature, Michael Beard is a creature of the past, not affected in any way by the vast changes that are occurring to us right now. Natural disasters, migrants fleeing ravaged countries, extreme politics and terrorism that occurs as a result, crop plagues, water shortages, schoolchildren demonstrations and birthstrikes are not part of Beard’s comfortable world – which makes it questionable that a character so isolated can be considered representative of any human being living in modern times. It also raises the question whether a novel that fails to take into account something so important can still be considered “serious”.

However, it could also be argued that this view is biased. Certainly there are people who still don’t consider climate change an important issue or even notice its effects: for example, only 55% of Russians believe in man-made climate change, a figure that has hardly changed in the past decade (economist.com), while in the USA (as already mentioned) even a simple question of whether last summer was hotter than usual or not receives answers heavily influenced by the respondent’s belief in climate change (Howe, Leiserowitz, 2013). It follows naturally that a person who does not believe in man-made climate change or notice it does not feel a need to see this issue reflected in literature.

And yet, even those who do not believe in climate change must have noticed the attention it has received and the protests it has sparked and wondered why societies all over the world suddenly find it hard to agree on what is true. With the rise of both seemingly unbelievable climate-change related stories in the press (as discussed in the chapter on “The Human Point of View in Climate Fiction”) and the so called “fake” news, plausibility and the very relationship between fact and fiction



is called into question. Certainly a “serious” novel, regardless of whether its author believes in climate change, should reflect that. Of course, this means that a novel such as *The State of Fear*, despite its numerous factual (and artistic) flaws, should also be considered “serious” – which, I would personally argue, is true: it is more serious than a novel that chooses to ignore climate change altogether.

Bearing in mind all of these factors, it is perhaps apt that climate change as a topic for novels found its way first into types of literature that were not traditionally considered “serious”. Being much more open to the improbable and much more welcoming of non-human characters, genres such as children’s stories and science fiction can more easily accommodate the topics that are important in the age of climate change. What should change, however, is our opinion of what should be considered “serious” – perhaps we will suddenly find that the human condition is much more seriously reflected by a paper-back science fiction book than a several-hundred-page romance novel. After all, not so long ago the weather would also not have been seen as a serious topic.

### Artistically Compelling Climate-Change Fiction

In the previous section, I argued that *The State of Fear* should be considered a serious novel. Many environmentalists, and readers in general, would not agree with this statement for three reasons. First, it is clearly factually flawed, based on cherry-picked science and irrelevant conclusions, leading readers to believe that climate change is a hoax. More importantly, despite its inaccuracy, it has been hugely influential, spreading its false message and convincing powerful people to disregard climate change. Which highlights an important aspect of any novel in which climate change is discussed: its message is often hard to separate from its artistic form, and it is often expected to be more than just an aesthetically pleasing piece of writing. This leaves writers struggling to include scientifically accurate facts into climate-change novels, only to find them criticised for becoming solely a way to advocate a cause but not compelling art in themselves, which is the third major flaw of *The State of Fear* – regardless of its message, it is simply a piece of banal, unengaging writing.

All of which may lead us to conclude that a good piece of climate-change fiction should be artistically compelling, include accurate science and send an important message without it being too obvious and thus damaging the art.

However, as Amitav Ghosh suggests, the modern novel is inherently unsuitable to narrate climate change as it is incompatible with drastic, unprecedented events that are inseparable from climate-change narratives. Although before the modern novel fiction “delighted in the unheard of and

the unlikely” (17), now it is focused on more individualistic narratives taking place in a restricted space and time frame. Anything else, he argues, would seem too implausible for a novel: “the calculus of probability that is deployed within the imaginary world of a novel is not the same as that which obtains outside it; this is why it is commonly said, ‘If this were in a novel, no one would believe it’” (21).

Yet as we have seen from the works examined here, none of these obstacles have prevented novelists from creating compelling works on climate change. *Flight Behaviour*, for example, is focused on one individual character and does not include any events that are “unheard of and unlikely”, but nonetheless manages to illustrate the potential impact of climate change with a narrative that shows clear appreciation of the complexity of climate change and has a powerful emotional impact on the readers. Works like the *MaddAddam* trilogy prove that “implausible” narratives can also be part of fiction that is widely read and discussed by scholars as serious fiction (and, with more and more bizarre and previously unthinkable events dominating the headlines of newspapers, it seems that the notion of plausibility will soon have to change as well). What’s more, *Carbon Diaries 2015* proves that even a genre that seems by default the opposite of serious and highly artistic literature, can convincingly express the reality of living with climate change. Furthermore, some of the children’s books that were discussed here, such as *The Lorax* and *Where’s the Elephant?* demonstrate that neither obvious moral messages nor lack of scientifically accurate information will necessarily ruin a fictional work on climate change.

All of which suggests that the crisis of culture and the imagination, as Ghosh calls it (13), may not be as severe as it may seem. Perhaps viewing climate change in general as a phenomenon that is distant and irrelevant can make it seem incompatible with serious literature, and, in turn, make all the literature that engages with seem less serious and less artistic. Another reason may be that the genre of cli-fi, perhaps more than others, includes a lot of stories by unprofessional writers, mainly scientists, who believe that the subject needs to enter literature and that their expertise in science can make such a work more accurate – although at the same time making it less artistically compelling. Of course, these are just speculations. But it would probably be safe to suggest that, with the climate crisis escalating and attracting ever more attention, it will not take long for more and perhaps better climate-change works to appear.

At the beginning of this thesis, I mentioned it was important to examine two aspects of the climate-change novels that are discussed here: the underlying attitudes expressed in them toward human nature and the natural world.

Rather disappointingly, there seems to be little difference in these attitudes between climate-change novels and other types of literature. There are, however, notable exceptions: “The Tamarisk Hunter” depicts scarcity that slowly helps the protagonist if not fully realise, then at least feel a deeper bond with the natural world as both he and the plants he is paid to remove become “offenders” for simply existing. The pigeons in *MaddAddam* also blur the boundaries between the human and the non-human, making the readers question human superiority.

As for human nature, it is rather strange to see an unwavering belief in its inability to change: whether it is sympathised with, as in *Flight Behaviour*, ridiculed, as in *Solar*, or simply stated as inescapable fact, as in *Windup Girl*, it is almost universally seen as something that even a complete transformation of the world could not affect.

However, it should be noted that this does not apply to children’s books. In almost all of the ones discussed here, animals and even plants are seen as every bit as important as people, with the biggest tragedy being the animals leaving for a different home. And humans (despite once being compared to dragons) are not beyond change. It would be interesting to examine why this difference exists. Are an equal relationship between humans and the natural world, humanity’s ability to change and act on our best instincts, and hope simply things that children are expected to grow out of? If so, let us hope they never do.

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## Summary

It has been said that throughout history, fiction has always responded to wars, crises and calamities. This is only natural bearing in mind that narratives have been said to help deal with threats by making them understandable and therefore bearable, and even being an essential part of healing, not just metaphorically but physically as well. Naturally, this highlights the importance of fiction as the field which invents, reflects upon, and changes narratives that influence our daily lives. It also explains why we expect fiction to respond to the most urgent and pressing issues of our times, of which today climate change is undoubtedly the most serious. This thesis aims to take a broader look at a diverse sample from the existing body of climate change fiction and examine what it reveals about the approach to climate change in Anglophone literature, how it addresses the issue, and whether it presents an artistically compelling work. The thesis examines the following works: the *MaddAddam* trilogy by Margaret Atwood; *Flight Behaviour* by Barbara Kingsolver; *The State of Fear* by Michael Crichton; *Windup Girl* by Paolo Bacigalupi; *Solar* by Ian McEwan; *The Carbon Diaries 2015* by Saci Lloyd, as well as the collection of short stories *Loosed Upon the World*. It also examines a number of children's books: *The Lorax* by Dr Seuss, *The Tantrum that Saved the World* by Megan Herbert and Dr Michael E. Mann; *George Saves the World by Lunchtime* by Dr Jo Readman; *The Trouble with Dragons* by Debi Gliori; and *Where's the Elephant?* by Barroux.